Machine and Tool BLUE BOOK

ESTABLISHED 1906

JULY 1952

- * Titanium
- ★ Intelligent Engineering Cuts Costs
- ★ Special Report on Drilling Machines

Washington News Letter

How's Business?

CONTENTS ON PAGE

"MARVEL"...

MARVEL AND THE STATE OF THE PARTY OF THE PAR

Has Always Had The EDGE

MARVEL High-Speed-Edge Blades assure Faster, more Accurate cutting with proven Economy and complete Safety. Only the MARVEL is a composite blade with a high speed steel cutting edge electrically welded to an exceptionally tough, strong steel body.

The High-Speed-Edge does the cutting while the alloy back with hardened eyes, carries the load. Blade tensions up to 300% higher than those possible with ordinary blades are recommended. This greater tension is confined to the cutting or leading edge by the location of pin hale (exclusive MARVEL design feature) and cannot be overcome by work resistance, Heavier feeds and greater speeds are practical without "run out,"

With greater accuracy, higher production and lower cost per cut, come the extra dividend of Safety, for MARVEL High-Speed-Edge Hack Saw Blades are Positively Unbreakable — they will not shatter.

Ask your local MARVEL distributor (see classified phone book) to help you modernize your metal sawing with Marvel High-Speed-Edge Blades. They cost no more trian ordinary high speed steel blades.

High-Speed-Steel cutting edge.

Tough unbreakable alloy steel body with hardened eyes.

Integrally weided to make a fast-cutting, long lasting composite blade that is positively unbreakable.

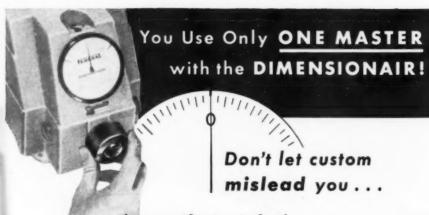
ARMSTRONG-BLUM MFG. CO.

'The Hack Saw People'

MARVELSAWS

5700 Bloomingdale Ave. Chicago 39, Illinois





The magnification is fixed . . . that is why its scale can be calibrated.

Both the Dimensionair and the master ring are constant. Only the dimension of your workpieces can vary. Because the Dimensionair is a precision measuring instrument with a constant scale value, only a single master is required to check the zero location. Don't let past customs mislead you. The Dimensionair is the only air gage built with enough precision to permit you to use a single master.

When the Plug Wears You're Still Safe with the Dimensionair.

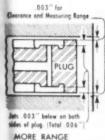
FIRST. This is so because the Dimensionair's greater measuring range allows greater clearance which in turn results in less plug wear. (The Dimensionair Range is .003" on a 2500 to 1 magnification.)

SECOND. Only jet wear can change calibration. Dimensionair jets can't wear because they are deeply recessed into the plug body. (On Dimensionair Plugs each jet is .003" below the plug surface.) Hence, a plug can be worn a great deal more than usual without any fear of wearing into the face of the jets.

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A single master is common practice in using Dial Indicators and other types of precision indicating gages. The inherent precision of the Dimensionair makes it possible for you to continue this practice. Those who already own Dimensionairs find this to be true. It is worth your while to learn how satisfactory it is to use the Dimensionair. FEDERAL PRODUCTS CORPORATION, 1257 Eddy Street, Providence I, Rhode Island.



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COLLETS and FEED FINGERS for BROWN & SHARPE machines



Specifically engineered, customer-shop tested and approved for Brown & Sharpe Machines, Hardinge Collets and Feed Fingers will reduce tooling costs and step up production.

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ordering information.



Master Feed Fingers with Adjustable Tension for No. 00, 00G, 0 and 0G Machines.

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answer both . . .

- 1. The problem of lowering costs
- 2. The problem of increasing output

By providing permanent, multi-purpose, inexpensive ARMSTRONG TOOL HOLDERS that use cutters or bits that are quickly ground from standard high speed shapes (Saving: All Forging, 70% Grinding and 90% High Speed Steel), the Armstrong System of Tool Holders will reduce your tool cost to an absolute minimum.

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There is no surer way to lower costs and increase output, than to use the correct ARMSTRONG TOOL HOLDER for each operation on all machines.

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"The Tool Holder People"

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Eastern Warehouse and Sales: New York 12, N. Y.
Pacific Coast Whse. & Sales Office: San Francisco 3, Calif.



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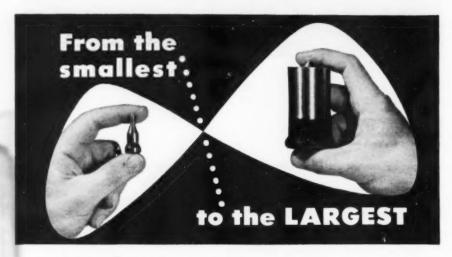
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CEA





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All-Steel Vise. Capacity 10" x 10". Extra long vises available with 24" or 40" openings. Catalog No. M-1732.

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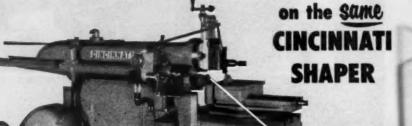
TREE TOOL AND DIE WORKS

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RACINE, WISCONSIN

Do STANDARD SHAPING

AUTOMATIC DUPLICATING



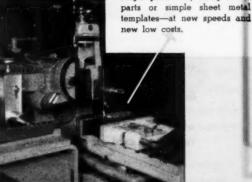
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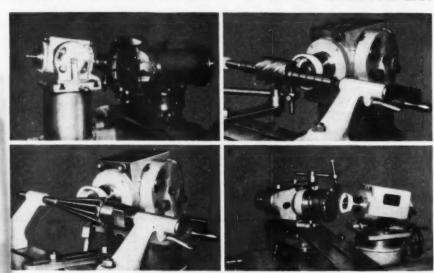
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No. 82



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Metal: SAE 2345 steel heat-treated to 28 Rockwell • Machine: Lees Bradner thread miller • Part: 5¼" adjusting screw for press brake • Operations: rough and finish thread milling • Tool: high-speed steel • Feed: 0.260 depth on roughing • Cutting Oil: Sunicut 105



BROACHING A GEAR KEY-

WAY. Metal: SAE 2345 steel forging 220 B-innell • Machine: 3L8 La Pointe hydraulic broach Part: gears for shaper, produced two at a time • Tool: 3' high-speed steel broach • Cutting Oil: Sunicut 105

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Metal: bronze 180 Brinnell • Machine: Gould & Eberhardt gear hobbing machine • Part: main drive worm gear wheel for large shear 42%" O.D.; 5" thick; 87 teeth Tool: high-speed steel hob • Feed: 0.006 • Speed: 42 rpm • Cutting Oil: Sunicut 105

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MORE THAN 1300 ACCESSORIES



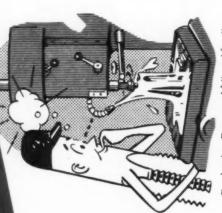
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DELTA POWER TOOL DIVISION

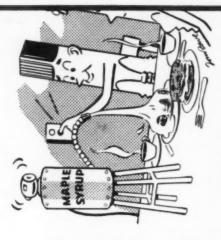
MANUFACTURING COMPANY 610G N. Lexington Ave., Pittsburgh 8, Penna.

For Delta dealers, see your Classified Directory under "Tools."

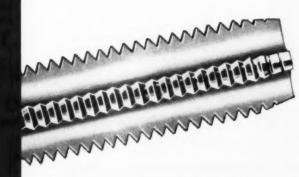
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July, 1952

23

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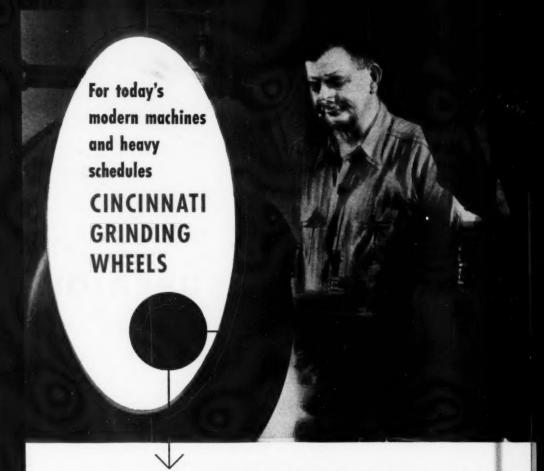
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A Production-Proved Product of
THE CINCINNATI MILLING MACHINE CO., Cincinnati 9, Ohio

Superior Quality



SUPERIOR



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Driven by constant speed motor, a steady, uniform speed is maintained as required for best results.

Catalog 71 BP on Request



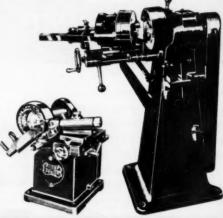
FAMED for PRECISION



WEST POINTERS' DRILL FORMATIONS ARE MOST ACCURATE

Precision is the keyword at West Point. The Corps of Cadets is famed for the precision with which its squads, companies and battalions parade in the most complicated of drill formations and maneuvers.





It has been proved in thousands of toolrooms that machine grinding is the best and most accurate method for restoring efficiency to drills. Oliver Drill Pointers give balanced cut with each lip doing equal work. The Oliver Way avoids costly production slowdowns—especially those due to excessive drill costs and imperfect holes—which can usually be traced to improper grinding of the drill points. When machine ground on Oliver Drill Pointers, drills will cut faster, last longer and produce more accurate holes.

No. 510 for drills 1/4" to 3"—2-3-4 flute. Variable clearances. Variable point angles Full automatic operation.

No. 21 Oliver Bench Grinder. Hand operated for Drills No. 57 to ½". Right hand, with an improved point. Attachments are available for grinding oil hole drills, left hand and other special points.

Write for our free Booklet "How To Produce More Holes With Your Drills!"

OLIVER INSTRUMENT CO.

1408 E. MAUMEE . ADRIAN, MICHIGAN SENDEN-BENGEN MACHINE

AUTOMATIC DRILL GRINDRES
TOOL & CUTTER GRINDRES - DRILL
POINT THINNERS - TEMPLATE
TOOL GRINDRES - FACE MILL
TORNORS - DIRECT NO WACHINIS



Investing in equipment demands selecting rugged, long-lasting machines that give top performance. You get both when you buy STRAND Flexible Shaft Equipment. The STRAND fine is complete and meets requirements. You'll find available the correct machine with correct H. P., a choice of R. P. M., belt drive or direct drive, varied mountings and many other features you may require.

STRAND equipment enjoys an enviable reputation for quality...you can buy it with confidence. It is sold through distributors in major cities.

High Speed Motor
Gives You
1700 RPM 7200 RPM
3600 RPM 9000 RPM

Standard Motor
Gives You
850 RPM 3600 RPM
1800 RPM 4500 RPM

Illustration shows
STRANDFLEX 4-Speed
Geer Drive Machine



EASTERN SALES
Woodberry, Baltimore 11, Maryland

WESTERN SALES
5001 North Wolcott Ave., Chicago 40, Illinois

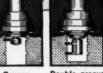
Waldes Truarc Internal Grooving Tool

for precision cutting of internal grooves in bores and housings FAST! ECONOMICAL! NEEDS NO SKILLED LABOR!



Internal groove-cutting becomes the simplest of operations with Waldes Trugre Internal Grooving Tool. Easy to adjust-easy to operate...readily adaptable to individual requirements.

Designed for use in any hand drill or automatic drill press and screw machine... assures a concentric recess without injury to metal. Operates by fingertip pressureespecially suitable for unskilled operators.



Double groove located from located from top of hole

top of hole



The Waldes Truarc Grooving Tool when used in an electric or pneumatic hand drill, can be taken to the job eliminating disassembly and excessive handling...resulting in all-around savings in time and costs!

Write now for descriptive brochure giving mechanical details. cutting sizes...extra features



WALDES KOHINOOR, INC., 47-16 Austel Place, Long Island City 1, N.Y.

Waldes Truarc Grooving Tool Manufa_tured under U. S. Pat. 2,411,426

Waldes K	phinoor,	Inc.,	47-16	Austel	Place
Long Islan	d City 1	, New	York		MT074

Please send me your descriptive brochure on Waldes Truarc Internal Grooving Tool.

Company___

Business Address_

PEDRICK PRODUCTION BENDERS

FOR REINFORCING BARS



SO SIMPLE THAT A GIRL CAN RUN THEM

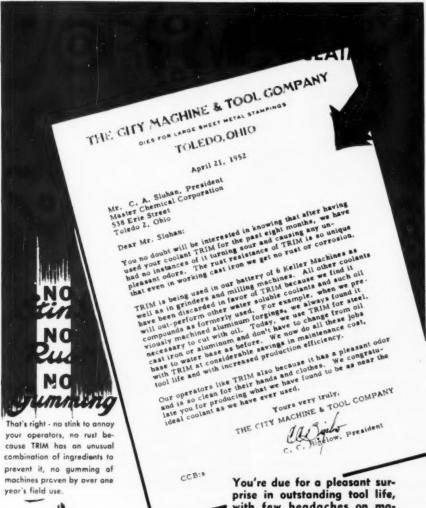
Smaller and larger machines available.

32

PEDRICK TOOL AND MACHINE COMPANY

Dept. 3

3640 N. Lawrence St. Philadelphia 40, Pa. U.S.A.





with few headaches on machine maintenance, when you use TRIM.

PRODUCT OF

MASTER CHEMICAL CORPORATION **TOLEDO 2. OHIO**

*TRIM is our trade-mark name for coolant concentrate covered by pending patent applications.

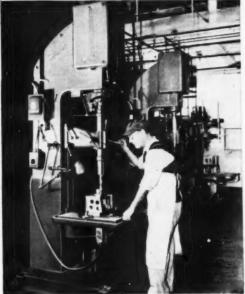


Tips on Better DRILLING



VARIABLE SPEED DRIVE REDUCES SETUP COSTS

Speed changes required for different drilling jobs add up to quite a time item, but not so with the "Buffalo" RPMster Drill. Its varjable speed drive allows the operator to select any of 101 speeds instantly by moving a lever and without shutting off the motor. Thus, with speed-change time eliminated, setup changes are made much faster, and costs are cut. These 99"-high precision drilling machines are saving money and time in tool rooms and machine shops throughout the industrial world. For complete engineering details, write for Bulletin 3257.



Two "Buffalo" No. 3 RPMsters turning out defense work in a large plant.



BUFFALO FORGE COM

161 Mortimer St.

BUFFALO, NEW YORK

MACHINE TOOLS

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

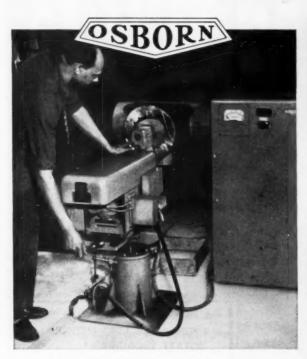
DRILLING

PUNCHING

SHEARING

CUTTING

BENDING



Deburrs gears 15 times faster at the push of a button!

Want to break a big bottleneck in the production of gears and similar parts? Manufacturers are doing just that with the Osborn Work Holder Brushing Lathe.

In the plant of the White Motor Company, Truck Division, Cleveland, Ohio, this Osborn machine deburrs and finishes gear teeth 1570% faster than the old method. This was done formerly with a portable grinder . . . a tedious operation that took 25 minutes for the 14-inch hypoid gears shown. Now, an operator simply places the gear in the Osborn Work Holder Brushing Lathe, pushes a button and the machine does the job automatically. Floor-to-floor time is only 11/2 minutes! Uniformity of finish results in additional time savings in matching and assembly of gears.

It will pay you to investigate this high-speed, high-quality machine for deburring and finishing gears on a production basis. Call your Osborn Brushing Analyst today or write The Osborn Manufacturing Company, Dept. 765, 5401 Hamilton Avenue, Cleveland 14, Ohio.



DISCORN FOWER, MAINTENANCE AND PAINT BRUSHES AND FOUNDRY MOLDING MACHINES



SET-UP IS SIMPLE. The machine is versa-\$4T-UP 15 SIMPLE. The machine is versatile. If your production involves small rous of many different types and sizes of gasts and similar parts, you can specify machine settings for each part and operator can make set-up changes easily and quickly for maximum daily output. The complete brushing cycle is controlled automatically by the electronic timer which is set for any desired brushing interval to suit the size, shape or condition of part being brushed.



OPTRATION 15 SPREDY. The operator mounts the gear easily and quickly. The gear advances to the face of two rotating Osborn brushes and the edge of the gear tech makes contact with the brushes. To assure fast, positive action on each piece brushed, as subtomatic control reverses the direction of brush rotation on every cycle of operation.



RESULTS ARE UNIFORM. Burrs and sharp edges are removed uniformly. Every gear tooth has smooth, uniform rounded edges. Surfaces are blended.

INVESTIGATE IT TODAY

for your problems. Users report time savings ranging from 20% to 1570% with the Osbora Work Holder Brushing Lathe. Let us demonstrate what it can do for you!

REELL HUIER

REFECT HOLES . PERFECT HOLES . PERFECT HOLE PERFECT HOLES . PERFECT HO HOLES . PERFECT HOLES . PER PERFECT HOLES • PERFECT HOLE PERFECT HOLES . PERFECT HOLES ET HOLES . PERFECT HOLES . PERFE SLES . PERFECT HOLES • PERFECT HOLES • PERFECT HO ES • PERFECT HOLES • PERFECT. • PERFECT HOLES : PERF CT HOLES . PERFECT HOLES . PERFECT PERFECT HOLES PERFECT HOLES PERFECT HOLES . PERFECT HOLES CT HOLES . PERFECT HOLES . PERFECT OLES . PERFECT HOLES . PERFECT PERFECT HOLES PERFECT HOLES ES • PERFECT HOLES • PERFECT FECT HOLES . PERFECT HOLES . PERFECT HO PERFECT HOLES . PERFECT HOLES . PERFECT HOL A NEW INVENTION! PERFECT HOLES . PERFE **ROTARY BROACHING*** HOLES . PERFECT HO

A NEW MACHINING METHOD!

. A NEW NAME-"ROTARY BROACH" *

ROTARY BROACHES may be used in lathes, turret lathes, automatics, drill presses, etc., to replace reamers. They produce perfect holes with finishes that can only be compared to honing. They last longer before grinding is necessary and may be resharpened 10 to 30 times. They produce perfect holes at a fraction of the cost of those produced by other methods. Eliminates grinding, lapping, honing and boring.

USE THIS NEW MACHINING METHOD-ROTARY BROACHING. You Cannot Afford Not To Use Rotary Broaches (Write for free descriptive literature) * "Retary Breach" and "Retary Breaching" are new names coined and copyrighted by Shearcut Tool Company. Patented in Canada. U.S. and Foreign Patents Pending (1947.

SHEARCUT TOOL COMPANY

BOX 746 . RESEDA, CALIFORNIA

Dept. BB-72



with PROCUNIER Tapping Heads

Month after month of steady, rigorous high speed production tapping is taken in stride with versatile Procunier Tappers. Built to rigid standards of accuracy and dependability, they provide longer hours of efficient tapping, with fewer costly shutdowns, less parts spoilage and a big reduction in tap breakage. These combined advantages enable operators to increase their capacity to handle bigger production jobs with greater ease, accuracy and speed. Only Procunier tapping attachments offer faster, smoother action, longer life, less wear and vibration with a minimum of maintenance.

Check these Procunier Advantages:

- Tap breakage is practically eliminated due to the high sensitivity of the new cork-faced friction clutch which automatically regulates the driving pressure.
- Strain and wear are minimized and tortion eliminated thru special gear reversing mechanism which distributes pull evenly.
- Tap wobble is eliminated because chuck spindle is supported at both ends.
- Aluminum housing assures greater strength with minimum weight—a vital factor for high speed tapping.
 PLUS MANY OTHER EXCLUSIVE FEATURES.

Write Today for more complete details and specifications on the complete line of Procunier Tapping Heads and see why Procunier offers the "finest in tapping equipment."

New Tru-Grip Tap Holder

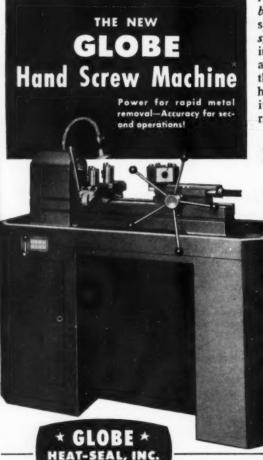
The exclusive Procunier "Tru-Grip" top holder is lighter, smaller in diameter. It affords easier topping close to walls or shoulders, eliminates "chewed" top shanks. Holds top true.

Procunier

Safety Chuck Company
14 S. CLINTON ST. CHICAGO 6, ILL.

PROCUP 14 S. C. Gentleme giving co the impro- Heads.	lint n: omp	P	lea	t.	ta	C	et	id	S	9	0	di fi	5,	at	III ie	l.	1	ri	a to	e d	1	8	b	-	es	h	0	8
Name																	* 1					×						
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Big, Husky Spindle! Rugged, Heavy Bed! Extra Work Capacity!



MACHINE TOOL DIVISION

The new Globe hand-screw machine provides ALL the features you've always wanted in a production lathe! Plenty of weight in bed, headstock and tooling for heavy loads, close tolerances and chatter-free operation . . . Oversize hole in spindle for big work diameters ... Precision tapered roller bearings for rigidity under high speeds and low . . . The right spindle speed for any job with instant speed selection! These are only a few of the features that make GLOBE today's best hand-screw machine buy-and it's priced in the ECONOMY range! ASK FOR CIRCULAR!

See this New Globe!

BRIEF SPECIFICATIONS

SWING: 10" over Bed.
BED: Length 4044", heavily ribbed, boxed ends. Ways hardened and ground.

SPINDLE: $1\sqrt{\pi}$ " i.D. Morse No. 5 Taper. Chucking Capacity: 1" 0.D. with bar collets; 14" 0.D. with nose-type collet chucks.

BEARINGS: Precision Tapered Roller Type, Sealed.

SPEEDS: Choice of 16; 184 to 3796 RPM

DRIVE: 4 position, quick change gear selector. Dual vee belts to 2 step cone pulleys eliminate belt slippage under unusually heavy loads.

MOTOR: Instant reversing, 2 speed 1 h.p. motor; 1800-900 RPM located in pedestal base.

PEDESTAL: Houses complete drive unit. Provisions for coolant pump and reservoir and collet storage.

*Equipped with GLOBE Production Cross Slide and GLOBE Heavy-Duty BED TURRET.

3381 Sa. Robertson Blvd., Las Angeles 34, California

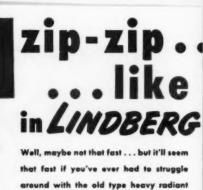


MON!—A WESSON Universal VISE SURE SAVES TIME and MONEY!

doon in tha' bed—gets under any job!

It eliminates many costly special fixtures in our shop.

**Common of the common of the com



Well, maybe not that fast . . . but it'll seem that fast if you've ever had to struggle around with the old type heavy radiant tubes. These new gas-fired, vertical tubes weigh only 29 pounds . . . almost as light as a razor blade by comparison.

All you do is turn off the gas, get on top the furnace, lift out the old tube, lower a new one in its place . . . and that's it.

Now to install now radiant tube . . . There's nothing to it. Just turn off the gas, lift out the old tube, and lower the new one in its place.

change radiant tubes blades in your razor! CARBONITRIDING FURNACES

Simple, isn't it? No furnace cooling necessary . . . no extended down time . . . no clumsy plugs to unbolt . . . no squirming around inside the furnace.

But ease of maintenance is only one of the advantages offered by this amazing Lindberg Carbonitriding Furnace. Check these important construction features:

Quench tank pit unnecessary ... Your Lindberg Carbonitriding Furnace includes a built-in pitless quench tank ... thus you avoid costly excavation and piping. But more important, this built-in quench tank minimizes distortion ... quenching takes place within the furnace structure, by means of a vertically operated elevator. Heated charges are never exposed to the air ... as would be the case if work had to be transferred from the heating chamber to a separate quench tank. Uniform case depth is assured because each charge automatically remains at heat the same length of time.

Prohest and purge chamber . . . Prior to entering the furnace heating chamber, work enters area immediately above built-in quench tank. Here, work is preheated . . . this reduces drastic temperature change when work enters heating chamber. Also, the work is completely purged while it is preheating.

Many furnaces in one . . . Furnace atmosphere is provided by Lindberg "Hyen" endothermic atmosphere generator that is easily adjustable to supply different atmospheres not only for carbonitriding, but also for carburizing, carbon restoration, bright hardening or annealing and normalizing. For annealing and normalizing the heated charge cools in the same chamber used for preheating and purging.

For additional information write your nearest Lindberg office . . . or Lindberg Engineering Company, 2442 West Hubbard Street, Chicago 12, Illinois.



CARBONITRIDING . . . Specifications called for .023 to .025" case on these low carbon seamless tubes. The charge weighed 450 lbs., and required 13/4 hours.



CARBURIZING . . . 450 lbs. of these bevelled gears, SAE 1020, required three hours total time to obtain a .032" depth.



ANNEALING... These SAE 1045 gear blanks were annealed to 174 Brinell. Temperature was 1550 F., time $1\frac{1}{2}$ hours. The charge weighed 350 lbs. Cooling was in atmosphere.

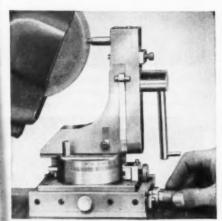
LINDBERG



FURNACES

.0001 Accuracy Faster Form-Dressing with J & S "Fluidmotion" * Radii and Angle Dressers

SHIPMENT FOR JULY - 2-3 WEEKS - F.O.B. EAST ORANGE, N. J.



Dress Two Angles Tangent to a Radius in one continuous Motion.

The Dresser with a $\underline{1}^{\prime\prime}$ travel micrometer feed.

For use in repetitive precision production, where extremely precise depth of radii and simplicity of operation are required. Lead-screw handle graduated to .001" — moves Dresser forward, backward with sensitive <u>range</u> of full inch.

MODEL "C" "Fluidmotion" Dresser up

"Fluidmotion" is the simplest, most accurate method for form-dressing. It allows dressing the entire angle-radius-angle wheel profile on surface and cylindrical grinders in one continuous motion—with one easy setting. A clean, precise form results, with no tool or chatter marks. Angles and curves flow into each other.

Highly skilled operators and elaborate set-ups are unnecessary. Beginners quickly learn to turn out contours accurate to .0001".

Features: Automatic centering, dustproof and chatterless, high-carbon, high-chrome construction—easily adaptable to all surface and cylindrical grinders, with J & \$ fixtures.

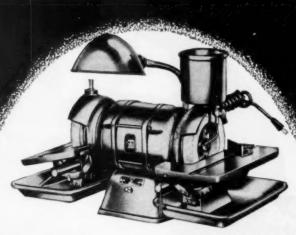
J & S "FORM-MASTER" ANGLE and RADIUS DRESSER—less expensive—dresses both angles and radius.

NOW AVAILABLE—WHEEL DRESSERS TO DRESS 36" DIAMETER WHEELS ON CYLINDRICAL GRINDERS. *REG. U.S. PATENT OFFICE.

Write for Further Information OTHER J & S TIME SAVERS:

J & S "ALL PURPOSE" JAW CLAMPS. SPECIAL PURPOSE FORM TOOLS OF SOLID CARBIDE OR HIGH SPEED STEEL





Carbide Tool Grinder for precision work

Clip this ad and mail for bulletins on Carbide Tool Grinder shown above and complete line of 6" - 12" general purpose bench and pedestal grinders.

Balder

BALDOR ELECTRIC COMPANY
4353 Duncan Avenue • 51 Louis 10. Missouri



A compact, rugged miller that gives the tool room what it demands — extreme accuracy and utmost flexibility. The NICHOLS TOOL ROOM MILLER is arranged for sensitive hand screw feed. It has generous table surface of 8%" x 30", with 19" longitudinal travel. Precision feed screws are fitted with oversize, easy-reading micrometer dials. Large hand wheels provide the element of "feel"

so important in precision milling. Rise-andfall spindle enables easy handling of many difficult operations—increases usefulness simplifies set-ups. Readily available are di-

viding head, vertical attachments, vises, and a full line of milling accessories. Priced surprisingly low. Descriptive literature sent on request.



MANUFACTURED BY W. H. NICHOLS COMPANY, WALTHAM, MASSACHUSETTS

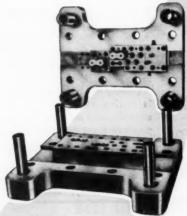


NICHOLS-MORRIS CORPORATION

76-G Mamaroneck Ave., White Plains, N. Y.



up with ... PRODUCTO



1/4" SAE 3140 hot rolled steel in coiled stock.

OPERATIONS

Station No. 1 - Whitney Chain markings clearly embossed on each

Station No. 2 - Four holes, two to a link, rough pierced.

Station No. 3 - Two chain links blanked out on each press stroke.

TOLERANCES

Hole diameter + .0005" - .0005" Hale centers + .001" - .001" Link Contour + .005" - .010" Die Set face parallel to feed slot + .002" - .002"

PRODUCTION RATE

153,000 links blanked per 40 hour week. Between grinds, 75,000 pieces.

HEED PROMPT SERVICE? CALL YOUR HEAREST PRODUCTO ASSEMBLY BRANCH Tough, 1/4 inch-thick hot rolled steel chain links are not are easy stamping job . . . especially when heavy production must be matched with close tolerances and excellent finish,

Here are the figures as this job rolls along at Whitney Chain on Niagara presses equipped with PRODUCTO 4-pin progressive die sets. It's typical of the way Producte Service teams up to set production records,

THE PRODUCTO MACHINE COMPANY 960 Housetonie Ave., Bridgeport 1, Connecticut

For Precision Die Sets Fast Call . . .



30088

July, 1952

Libert Hi-Speed SHEAR

CIRCLE CUTTING ATTACHMENT STANDARD EQUIPMENT with this Machine



1236

SIMPLIFIES Maintenance SPEEDS Production SAVES Manpower

> The Libert has amply proved its advantages by turning out top production-shearing flat or formed sheet metal, internal or external, plain or irregular shapes rapidly, accurately, cleanly!

> Equally effective in maintenance work, Libert is cutting costs to rock bottom. Edges are smooth, need no finishing. Unskilled operators produce accurate work at once.

Sizes up to 60-in. throat, 10-gauge capacity.

LIBERT MACHINE COMPANY Green Bay, Wisconsin

HYDRAULIC INDEX TABLE

This table is driven by a fluid motor and is locked in the indexed position by a hydraulically opergted shot bolt. The table rides on hardened and ground wear strips, is automatically lubricated, and the table spindle is mounted in heavy-duty tapered roller bearings.

Can be furnished in sizes 30", 36", 42" and 48".





Ingineering Company, Inc. 4700 BURLINGAME . DETROIT 4. MICHIGAN



A Buckeye CALKER Horizontal Grinder, 15,000 RPM, with BGA-21 Belt Grinding attachment.



A Buckeye DARKAD Horizontal Grinder, 9,000 RPM, with BGA-42 Belt Grinding attachment.

Now—you can save up to 50% on grinding costs, using the new Buckeye Belt Grinding Attachments on Buckeye 15,000 RPM and 9,000 RPM horizontal grinders. Here, for the first time, Buckeye has successfully combined the maneuverability of the portable grinder with the utility of the abrasive belt. These compact new units will pare production time and costs on many applications where mounted wheels, abrasive discs, snagging wheels, cones and hand files have provided only a partial, costly solution to grinding problems.

Attachments, designed for use with Buckeye horizontal grinders, are sold separately and may be adapted to other air and electric grinders of the proper type and speed. Write—now—for complete information.

Duckeye Tools

DIVISION 14 . DAYTON 1, OHIO

Portable Air and Electric Tools for Industry

IN CANADA.

Joy Manufacturing Co. (Canada) Ltd., Galt, Ontario

YOU CAN BENEFIT FROM

Use the DoALL method for fast low cost machining. Shape and save all types of material. Release larger expensive tools for more profitable operations.



DoALL CONTOUR-MATIC—Finest, most useful band machine built. Variable tool speed 40 to 10,000 feet per minute. Saws, files, polishes, grinds, hones, slices all materials. Hydraulic operation.

DOALLS PAY IN

WHATEVER your band machining requirements, you can find the right model in the DoALL line. There are standard machines to meet almost every conceivable requirement; seven frame sizes; five throat sizes; speeds from 40 to 15000 f.p.m.

There is a fixed speed, 16" Utility machine for only \$350. There is a combination bandsawing, filing and polishing Utility model with dual variable speed and attached saw blade welder for only \$750—the biggest bargain available anywhere in a band machine.

There are the big, high speed Do-ALL Zepbyr machines, to handle work loads weighing a ton or more and with Hydro-Feed tables for fast, la-













GAGE BLOCKS

GABING EQUIPMENT

MORRE INSPECTION I

DOALL BAND MACHINING!



DoALL "ZEPHYR" MACHINES—For safe high speed sawing, up to 15,000 feet per minute. Widely used for Friction Sawing. Single or variable speed —16" to 60" throat capacity.



DoALL CONTOUR MACHINES
—For precision bandsawing, filing and polishing in every metal working shop. 16", 26", 36" or 60" throat capacity with work height under guides as required.



DoALL "UTILITY" MODELS— Light duty low cost landsaw ing machines. Fixed speed for plastic or woodworking—variable speeds for metal sawing filing or polishing.

ANY SHOP PRICED AS LOW AS \$350

bor-saving production.

The DoALL Contour-matic is unmatched in operational scope, quality of work and productivity.

DoALL Contour machines are work horses of the metal shop, handling hundreds of cutting jobs with accuracy and speed.

And, there are special production machines built to order for high output on your special applications.

Call your local DoALL Sales-Service Store or write for free demonstration in your plant.

The DoALL Company
254 N. Laurel Ave., Des Plaines, III.
ASK FOR CATALOGS
8.155



BAND TOOLS FOR

—The right band for sawing, slicing, filing, grinding, honing, polishing every material. Blades for all makes of band machines. Ask for literature.

> 38 Sales-Service Stores in North America

DOALL



SAW BLADE WILDERS



BANG PILER



SENCH FILES



-



TOOLWANDERS LAVIN



-



double angle shears

TWO shears in ONE machine!

If you're using obsolete, slow-poke methods of shearing, the Kling Double Angle Shear can help you save time and money. This modern compact machine is designed for high speed, high production shearing on both long and short run jobs. Many metal fabricating plants and steel warehouses have found the Kling Shear to be the workhorse of the shop. For instance, one machine will shear round bars and bar angles on the left side while the right side can be used for structural angles and flat bars. The machine is built with the speed and power to handle the bulk of your shearing requirements. For shops with considerable mitre shearing work, Kling Double Angle Shears can be mounted on a turntable to facilitate handling. Automatic hold downs and one-shot lubrication can be furnished when desired. Sizes to handle angles up to 8" x 8" x 11/2".

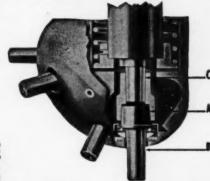
WANT TO CUT SHEARING COSTS?

Find out how this high-production machine can give you more cuts, cleaner cuts on your shearing operations. Write for more information and latest bulletin. Kling Bros. Engineering Works, 1323 North Kostner Avenue, Chicago 51, Illinois.



MORE HOLES PER HOUR - PER DOLLAR

Increase production of any standard drilling machine by adding a Ligno-matic, the only drill turret with the patented, self-centering principle that guarantees sustained accuracy equal to the drilling machine itself.



FOR ALL CONSECUTIVE DRILL PRESS OPERATIONS

PROVED PRODUCTION INCREASE

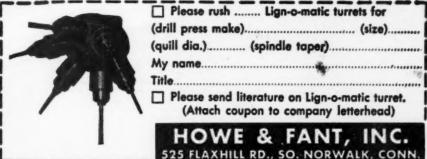
- Turret indexes faster than tools can be changed or work moved to another spindle. A single Lign-o-matic will release 5 drilling machines for other work and still show increased production and reduced costs on original job.

VERSATILITY—Fits any standard drilling machine without altering the machine. Handles operations such as drilling, reaming, counterboring, and tapping (on reversible spindle machines), up to ½" diameter in any material.

PRECISION — Patented, self-centering tapered drive (A) automatically locks turret spindle (B) into exact alignment with drilling machine spindle (C) for sustained accuracy.

GUARANTEE — May be returned in 10 days for any reason for full refund of purchase price. Two-year guarantee against defective parts.

DELIVERY— Currently, 2 weeks.



CUTTING 20 GAGE and 5/8" PLATE SIDE-BY-SIDE AT ONE STROKE

Photograph shows operators cutting % plate and 20 gage sheet steel simultaneously on NIAGARA Power Squaring Shear. No change in knife adjustment is necessary.

The ability of Niagara Power Squaring Shears to cut thick and thin place both at the same time with the same knife setting is a dramatic demonstration;

Visitors at our plant can see this done every day.

There is no necessity for tinkering with the knife adjustment

Demonstrates The Sound Engineering Design of POWER SQUARING SHEARS

There is no compromise with sound, proven engineering when it comes to NIAGARA shear design and construction.

Accurate cutting depends primarily on rigidity of the shear's components. For bed, crosshead and holddown NIAGARA uses CLOSED BOX SECTIONS to resist with minimum deflection the horizontal, vertical and diagonal or torsional loads to which every shear is subjected.

NO OTHER SECTION WILL DO THIS JOB AS EFFICIENTLY.

Angle or channel shaped sections have long since been abandoned for use on NIAGARA Power Shears.

The economy of quality is remembered long after price is forgotten.





BED, CROSSHEAD & HOLDDOWN DESIGN

DISTRICT OFFICES: DETROIT, CLEVELAND, NEW YORK



NOBLEWEST Automatic NUMBERING HEADS





Fast, accurate and dependable, Noblewest Numbering Heads can be used either in marking presses or in roll marking machines - wherever permanent serial numbering is required on steel and other metals, wood, fibre, hard rubber and plastics. Available in a wide variety of models and sizes that offer unlimited applications, for constant, selective and consecutive numbering. Typical applications include numbering on nameplates and component parts. They also furnish a direct reading at all times of the exact number of pieces marked - a valuable aid to production control. For complete data write Noble & Westbrook Mfg. Co., 9 Westbrook Street, East Hartford 8, Conn.

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A SHEARPROOF PUNCH

Now! Costs Knocked Out! Shearproof does the work of two or more at far less cost.



Work samples made complete with 4x4 punch illustrated below used in 8.7 Turret Press.





TURRET TYPE

These retractible heel punches adaptable to all Turret Type Presses, any punch size, for notching, perforating and nibbling.

HERE'S WHAT IT DOES!

- I. Increases punch and die life.
- Notch, perforate and nibble with this retractible heel punch.
- 3. Eliminates bad burrs.
- Increased safety for operators. Decreased liability costs.
- 5. Cuts "down time" of machines.
- Use same punch for more operations without changing setup.
- Eliminates restrictive heel punches except in special cases.
- Cuts production costs due to eliminating positioning of hits.





OPEN DIE SET TYPE

This retractible heel punch adaptable to all type presses, in all sizes for irregular notching, perforating and nibbling.

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WANTED
WRITE TODAY

Manufactured and Sold Exclusively By

ARC MANUFACTURERS, 2008 WABASH AVE., SCHENECTADY 6, N. Y.

	CLIP THIS COUP	ON
Please rush information on your new patented punch	We are interested in Turret Type Special Holder Type Open Die Set Type	Name

CHUCKS THAT HAVE WHAT IT TAKES AND YET PRICED UNBEATABLY LOW

Our Business Has Been Built On Selling Fine Chucks For Less Money!

L-W 5" UNIVERSAL 3-JAW LATHE AND SCREW MACHINE CHUCK

An Unbeatable Value At Only \$30.22

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Fits any lathe having 1½"-8 thread spindle. Using back adapter plate, it mounts on any size or type.



Fits L-W 6½" SD Dividing Head. 3 tough hardened steel pinions. Two sets of accurately cut hardened and ground steel reversible jaws. Cast semi-steel body

fround to	fine finish.				
		W	eight	Jaw Width	
5"	\$30.22	9	lbs.	1/2"	
61/4"	\$42.04	18	lbs.	3/4"	
71/2"	\$52.86	25	lbs.	3/4"	
1012"	\$110.61	70	lbs.	1"	
Dad 6					

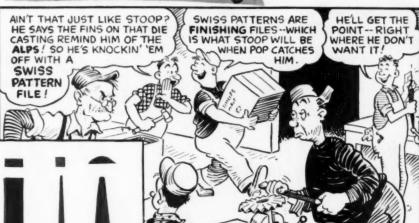
L-W 4-JAW CONVENTIONAL TYPE HEAVY DUTY INDEPENDENT LATHE CHUCKS

		Weight	Jaw Width
6"	\$21.86	111/2 lbs.	5/8"
8"	\$27.41	20 lbs.	3/4"
10"	\$59.97	55 lbs.	11/4"
12"	\$68.50	75 lbs.	11/4"
14"	\$79.61	91 lbs.	11/4"
16"	\$104.69	140 lbs.	11/2"
18"	\$137.96	160 lbs.	11/2"
			MI-4-15-4-4

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- Motor is mounted on adjustable plate in air-flow base.
- 2. Grinding wheel is mounted on large diameter spindle with Timken tapered roller bearings, which are adjustable for wear, in heavy C. I.

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- Vee belts from motor to spindle and pump are adjustable.
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- weights are provided in wheet flange.
- Tool rest consists of a combination rest and wheel dresser.
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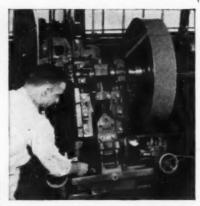
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ANOTHER Viking First No Chip Breaker



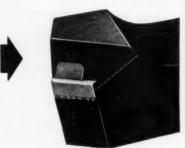
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WITH VIKING V-BACK ADJUSTABLE CHIP BREAKER
TURNING TOOLS

SAVE YOUR PRECIOUS DIAMOND WHEELS

Here's how . . .

- Separate chip breaker block and tool tip simultaneously locked in tool holder with one locking device.
- Solid carbide block provides trouble free, long life chip breaker. No chip breaker grooves to grind into the tip each time tool is sharpened.
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- Carbide to carbide contact of chip breaker block and tool bit allows no wedging of chip under breaker to fracture the carbide.



Put Viking Tools to work in your shop. Compare the savings in Carbide and Diamond Wheels. Write for literature giving further details.

Holders supplied in shank sizes from 3/4" to 2".

Straight turning, 20 degree lead angle, offset and facing tools.

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VIKING TOOL COMPANY SHELTON

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Precision . . . built-in to last . . . is assured by: Preloaded roller bearing supported spindle, bearings on all hetadstock shafts, oversized heat-treated headstock gears, .0005" accuracy at every alignment point, taper aibs throughout.

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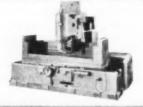
HYDRAULIC SURFACE AND CONTOUR GRINDERS



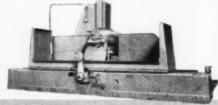
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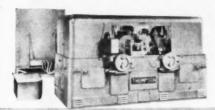


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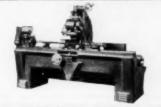
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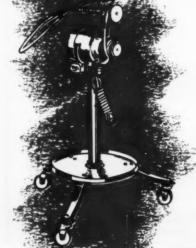
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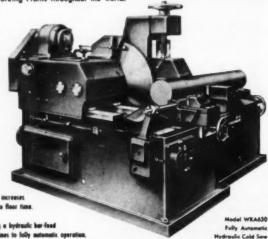
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Fully Automatic

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Write for Bulletin 39b fully describing these Cold Saws

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Medium Duty 16"-18" Heavy Duty 20"-25" Heavy Duty 32"-36" Heavy Duty 40"-50"

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Simplicity in construction, simplicity and safety in operation.

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Self-compensating hydraulic friction clutches and brakes.

Speed changes through positive clutches, gears remaining in constant mesh.

Spindle release for chucking.

Perfect, safety control lubrication with filtered oil.

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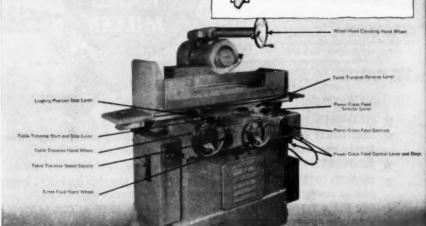
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This 8" Norton Surface Grinder

cuts unit costs on all kinds of jobs!

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production or tool room military or civilian



NOTE SIMPLICITY AND CONVENIENT GROUPING of controls on the Norton 8" x 24" surface grinder. Quick set-up cuts your unit costs . . . makes "breaking in" of new production help far easier.

Here's a rugged machine that sets up quickly and maintains accuracy on production runs. But it's also efficient for grinding a variety of small units in tool room work. Its quick set-up saves you time from job to job.

It's a wise investment for you now because it's good for special military contract work... and just as good later for your "civilian" production. Investigate this great new grinder and its companion machines, the Norton 6" and 10" hydraulic surface grinders.

Remember — only Norton offers you such long experience in both grinding machines and wheels to help you produce more at lower cost. And Norton also offers you the world's most complete line of grinding machines.

We'll be glad to discuss your present problems or your plans for "post emergency" production, fitting tentative delivery schedules into your plans for the future. In the meanwhile

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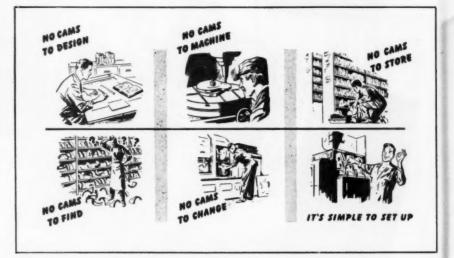


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- wise Description 1163 MANUFACTURING PLANTS (some of which use as many as 30 machines)—yet on the market a scant few years.
- ★ UNIQUE VERSATILE. Nothing else like it. One or several machines can be the answer to some of your production problems.

Write today for further information. H. B. ROUSE & COMPANY

2214 N. WAYNE AVE., CHICAGO 14 50 YEARS OF SERVICE TO INDUSTRY

No cam worries with a Warner & Swasey 5-Spindle Automatic





5-Spindle Bar Machines

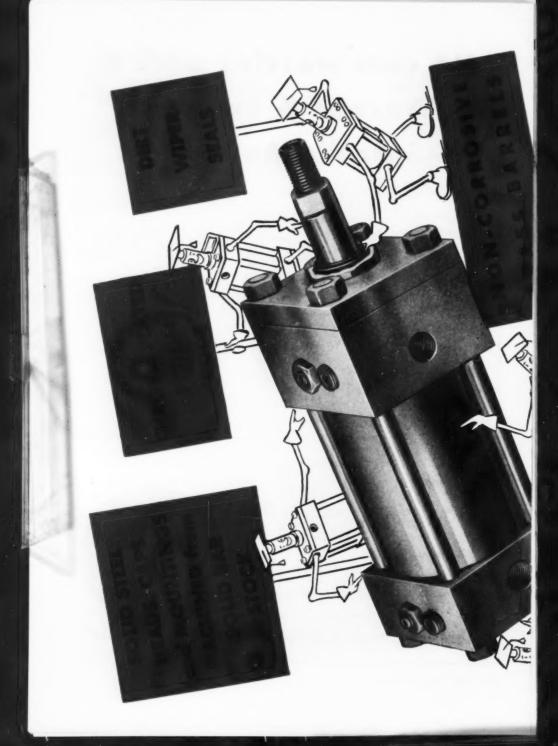
-1½" Standard Capacity

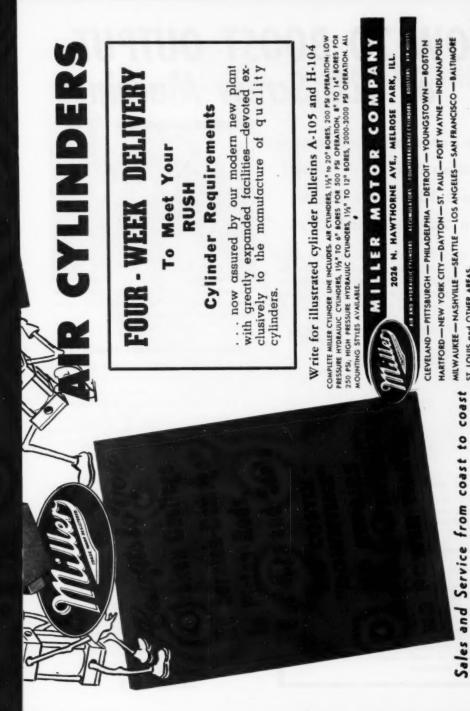
-2½" Oversize Capacity

5-Spindle Chucking Machine-6" Swing

WARNER
&
SWASEY
Machine Tools
Cleveland

IT'S SIMPLER TO SET UP A WARNER & SWASEY CAMLESS AUTOMATIC!



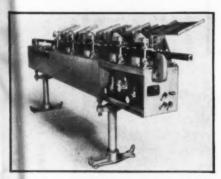


ST. LOUIS and OTHER AREAS.

HOW TO BOOST OUTPUT of OLD Screw Machines

Lipe Automatic Magazine — Loading Bar Feeds jump output 30% and more on 15 to 30-year old B&S's!

Lipe's AML Bar Feed greatly speeds-up stock feeding. Enables a screw machine to produce 90% or more of its gross geared production capacity. Increases output at least 30%—in many instances better than 100%!



Lipe AML Bar Feeds help overcome new equipment shortages . . . cut cycle time, increase actual gross of older machines,

Model AML Bar Feeds Available For...

B&S No. 00 Spindle Bore 11/4"
B&S No. 00 Spindle Bore 11/4"
B&S No. 0 Spindle Bore 14"
B&S No. 0 Spindle Bore 1"

Other Lipe Pneumatic Bar Feeds available for other screw machines, automatic or hand, handling from 16" to 212" diameters.



This battery of 25-year old screw machines received a production "shot in the arm" when equipped with Lipe AML Bar Feeds.

Makes feed fingers obsolete

Lipe's AML Bar Feed is actuated by a pneumatic control system. Stock is fed through the collet by a pusher rod behind the bar. There is no other point of contact. This method of feeding does away with feed fingers... abolishes multiple feed finger feedouts... eliminates scratching and marring of high-finish stock... reduces scrap and rejects.

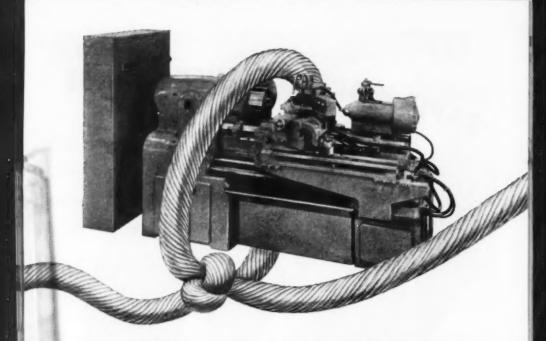
Load it ... forget it

Magazine holds a normal 8-hour day run of stock. Capacity ranges from $19-\frac{9}{6}$ " bars to $96-\frac{1}{6}$ " bars. Loading and feeding are automatic. Stock is fed continuously—there's no idle operation—no "cutting air." Operators are relieved of repetitious stock bar handling... can attend a greater number of machines.

Convert your old screw machines into modern, high-production equipment . . . economically! Let our engineers show you how. No obligation. Write

Lipe-Rollway Corporation Syracuse 1, N. Y.





90% SAVINGS

Here it is in a nutshell, fresh from the Monarch Mona-Matic installation at the Sargent Engineering Corporation of Huntington Park, California. The part is a fork 6" x 2" OD, made from a 4130 chrome-moly

forging heat treated to a hardness of 125,000-145,000 psi before machining—"a tough machining problem from the beginning." Now, look what happened to the production time when the Mona-Matic went to work:

THEN	1	OPERATION	NOW	1
Turret Lathe	30 min.	Rough Cut		
Engine Lathe	10 min.	Semi-Finish Cut ,	Mona-Matic	5 min.
Grinder	10 min.	Finish		
3 Machines	50 min.		1 Machine	5 min.

That makes a 90% reduction in machining time alone, and it's just the start! Set-up time for the job has shrunk from more than 3 hrs. to less than 20 min. One machine has replaced three. Only one operator is required (and he could easily handle two Mona-Matics if necessary). Add all that up—and is there anything

more that we have to add to it?
What is this machine that consistently turns out production savings like this on short runs and long ones alike? That's where the string on the

like this on short runs and long ones alike? That's where the string on the story comes in! Aren't you convinced that you'd better return our handy coupon right now? ... The Monarch Machine Tool Co., Sidney, Ohio.



THE MONARCH MONA-MATIC (Main Illustration and Above, with Work Piece). This is a new and outstandingly successful approach to production metal turning. Use of a single tracer-controlled running tool speeds production, slashes tool costs, tool change time and set-up time, increases accuracy, and slashes time required for subsequent grinding operations. Available with magazine load,

with a String Attached!



FOR A GOOD TURN FASTER...TURN TO MONARCH

THE MONARCH MACHINE TOOL COMPANY, Sidney, Ohio

Gentlemen: I am interested in your Mona-Matic story and would like to receive your illustrated Booklet, with complete data and job performance reports. Please send me your Booklet 1804 without obligation.

NAME	TITLE
COMPANY	
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Conventional Rectangular Gage Block.

.360 by 1.375".

Area .51 square inches.

For ordinary use.

SOLID SQUARE MASTER BLOCK

1 1/4" by 1 1/4".

Area 1.56 square inches.

The 30 Year Blocks.

Read about the startling wear tests on Van Keuren Solid Square Master Blocks.

They are unconditionally guaranteed against wear in excess of .0001" for 5 years for any reason whatsoever.

Write for your Van Keuren 1952 Catalog and Handbook No. 35

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Light Water Squamman + Light Water Management - Light Water - Sheep Transple were - Sheep Transple - Sheep Transple - Cacheline Measuring Water - Cacheline Measuring Water - Cacheline Measuring Water

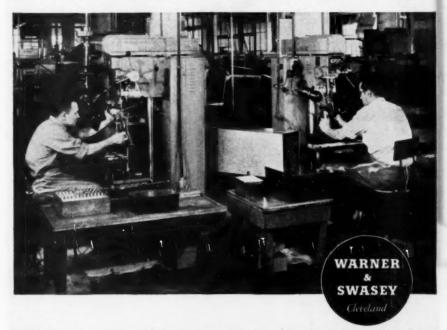
A "make or break" operation

VERY OFTEN when a part reaches a Warner & Swasey Precision Tapping and Threading Machine, nearly all the required machining has been done. Now all that remains is accurate tapping to proper depth, and the piece is ready for inspection and shipment, or further assembly.

Most of these are precision jobs that must meet Class 3 fits or better. In blind holes, uniform depth tolerances must be maintained. Inaccuracies now would mean a rejection of the piece, and the loss of all the previous timetaking machining operations.

It is because these final tapping or threading operations are such "make or break" operations that more and more manufacturers are turning to Warner & Swasey Precision Tapping and Threading Machines. Warner & Swasey's positive lead screw principle, with solenoid-actuated guide fingers to lead the tap in and out of the work, reproduces the accuracy of the tap itself—eliminates any chance of thread inaccuracies caused by drag or backlash.

Where your schedules demand precision tapping on a production scale, call in our Field Engineer and have him show you how a Warner & Swasey can help you speed up your production.



WOU CAN MACHINE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY TURRET LATHES, AUTOMATICS AND TAPPING MACHINES

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NYLON REINFORCED ABRASIVE DISCS

1/8" Thick Yet Flexible



The only really flexible grinding wheel ever offered

for blending welds the Better way

better because - They are More Durable

DuraCut's life expectancy is 10 to 25 times that of ordinary coated abrasive discs, meaning less down-time for disc-changing — more productive time on-the-job.

better because - They are Faster Cutting

DuraCut's unique waffle pattern with multiple layers of abrasive grain allows sharp, instantaneous cutting throughout the life of the wheel. Whether it's light snagging, smoothing or blending, there's a wide range of specifications to assure obtaining a fast-cutting, long-lived wheel for your job.

better because - They are Built Stronger

Every component part, from bond to backing, is designed and treated so as to lend added strength and flexibility to the finished product.

TYPICAL APPLICATIONS:

Finishing light welds on sheet metal jobs. Automotive, truck, railroad car or locomotive and aircraft body work. Blending welds on sinks, refrigerators, stoves, metal cabinets. Rust and scale removal.

ask for a demonstration on your work

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Branch Offices and Warehouses —
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BAY



Fast Recordings! Indications are virtually instantaneous even at many feet from the unit.

No Falling Off of Pointer! There is no flutter. Pointer action is positive. Repeatability is excellent. Novel tolerance markers speed reading.

Use Untrained Operators! Since measurement is made without mechanical contact, anyone who can read a dial can operate a Taft-Peirce CompAIRator.

Ultra-Sensitivity! Variations such as taper, out-of-roundness, bellmouth, barrel shapes (normally undetected by ordinary gages) are shown instantly

Constantly Accurate! Vibration, jarring — even tilting — do not disturb accuracy. Nor does coolant flow or sludge on parts, air stream automatically clears the surface.

Less Expensive To Operate! Taft-Peirce CompAIRators are built to withstand the hard knocks and wear and tear of shop use. Their rugged construction eliminates expensive maintenance. Air consumption is less than 10 cubic feet per hour.

Readily Portablet Only 7" wide, 8" high, 7½" deep, the Taft-Peirce CompAIRator is easy to carry and handle. Even the regulator (to eliminate variations in air supply) and the filter (to remove

moisture, oil, and other foreign matter) are inside the case.

Wide Renge! Standard dials are available for .001". .002". .003". .004" and .008" ranges on a 180° five inch arc. Amplifications are 5000 to 1, 2500 to 1, 1875 to 1, 1250 to 1, and 625 to 1 respectively. Special scales can be furnished on order. And two simple changes requiring only a few minutes time converts a Taft-Peirce

CompAIRator from one amplification to another.

Write Today for This Bulletin



The TAFT-PEIRCE Manufacturing Co.

increase

PROFILE GRINDING PRODUCTION 50% to 75%

with THE CONTACTOR



HECOMATIC at work on 20 mm. projectiles

ENGINEERING SERVICE

Heco Engineering Department will be pleased to receive your inquiries regarding the Hecomatic method as applied to your profile grinding job. **HECOMATIC** is the answer to the problem of automatically feeding, chucking and ejecting profile work on centerless grinders—with greater speed and accuracy.

It proved itself during World War II in munitions plants in the United States, Canada, England and Australia, and is again being made available to the metal working trade and ordnance contractors.

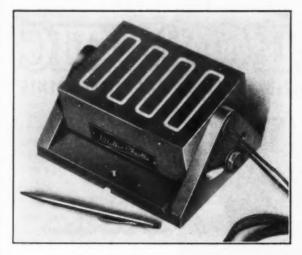
HECOMATIC consists of three light weight units—the magazine, power unit and electric solenoid ejector. Completely automatic, it accomplishes all the operations man would do in hand feeding, grinding and ejecting.

Although originally designed for work on 20 mm. projectiles, slight alterations will permit HECOMATIC to function on almost any type profile grinding job, giving uniform quality of work and production increases of from 50% to 75%.



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DEPT."M" LITTLETON, COLORADO, U.S.A.

Walker Does It Again-



Special

5" x 7"

Swivel

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- LARGE or SMALL, your problem receives the same careful consideration by Walker engineers.
- 2. Whether the operation requires a chuck 3" diameter or 60" x 192" Walker has the answer.
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- The Walker line also includes chucks for nonmagnetic materials.

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Original Designers and Builders of Magnetic Chucks





- 1. 90° Universal Milling Head
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- 3. Deep Hole Internal Grinder Head
- 4. Basic Milling Unit
- 5. Milling and Grinding Table
- 6. Universal Feed Table
- 7. Internal Grinder Head
- B. External Grinder Head
- Slotting and Keyseating Head
 Geared Dividing Head



THREE SIZES

MODEL "C," $\frac{1}{2}$ hp - 9" TO 13" LATHES MODEL "B," $\frac{1}{2}$ OR $\frac{3}{4}$ hp - 13" TO 18" LATHES MODEL "M," 1 OR $\frac{1}{2}$ hp - 18" TO 72" LATHES

The Master attachment can be used profitably on many production operations. Mount it on your present equipment, lathes, turrets, mills, or use independently to perform additional operations in the same set-up. The basic milling unit with the above types of precision heads gives you facilities for milling, grinding, boring, drilling, indexing, slotting, and keyseating, internal and external. Its full complement of equipment is an outstanding value for maintenance, repair, tool room, and

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MAKES LOW-COST INDEPENDENT PRODUCTION SET-UPS - PORTABLE - SELF-POWERED



Milling on turret lathe completing part in one set-up



End Milling 21/5" keyway in 975" diameter shaft 22 ft. long



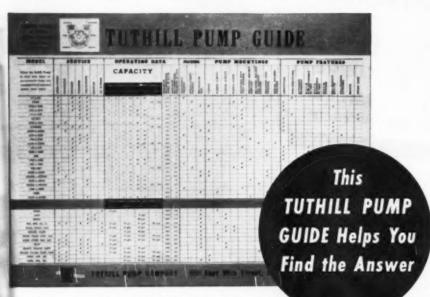
Master Slotting Head on lathe cutting internal taper keyway



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MASTER MANUFACTURING CO

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To save you time and trouble in selecting the pump best suited to your application, Tuthill engineers have developed this revolutionary new

Pump Guide. Here, in one easy-to-use chart, is a volume-full of information on the complete line of Tuthill Pumps.

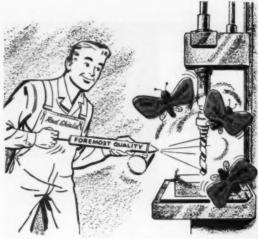
Tuthill Positive
Displacement
Pumps Serve Industry in Lubrication,
Hydraulic, Coelant,
Oil Burning, Circulating and Transfer
Service.

At a glance, it shows you the services for which each model is built, together with performance characteristics, types of packing, mounting styles and distinctive features that enable you to fit the pump to your need, rather than the need to the pump.

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TUTHILL PUMP COMPANY
939 East 95th Street • Chicago 19, Illinois



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YES, Standard Red Shield Drills do "get the bugs out" of drilling. Their uniform quality gives uninterrupted production, helps reduce costs.

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STANDARD TOOL CO. CLEVELAND 14, OHIO



STANDARDIZE AND SAVE WITH STANDARD RED SHIELD METAL CUTTING TOOLS. STANDARD DISTRIBUTORS IN MORE THAN 300 CITIES CAN SUPPLY YOUR REQUIREMENTS.

If you are interested in really reducing piercing costs on short ran work, read these facts reported by a Weidemann RA-4IP user:

"We have had one Wiedemann in operation for 13 months and a second for 8 months. During the time these two machines have been in operation they have handled over twenty thousand major electronic chassis with approximately five hundred different perforations and patterns—each pattern having no less than one hundred perforations, and, in many cases, as high as six hundred. The Wiedemann machines have made it possible to do these jobs in approximately one fifth of the time it required previously. In many instances no additional tool cost was incurred. Where additional tooling was required, the cost was less than one hundred dollars a job."

Stone and Smith's production record is typical—manufacturers of such diversified products as road machinery, switchgear, electrical products, aircraft, electronic equipment, ships, kitchen equipment, are making similar savings with Wiedemann Turret Punch Presses—short run piercing at long run low cost.

Your production requirements will be given our thorough attention.

With our two Wiedemanns
we piece major electronic
chassis in about one fifth the
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N. L. Smith, Vice President STONE & SMITH, Inc. Los Angeles, California

WIEDEMANN MACHINE COMPANY

4265 WISSAHICKON AVE PHILADELPHIA 32 PA Threaded pieces produced FASTER...automatically with the improved model H1

HOB THREAD Coulter provides even greater ranges of speeds and feeds — high speeds for non-ferrous metals, slow speeds for heat treated meterials. A special high speed drive-to-work spindle permits tentral of light facing cuts or indicating the work before threading. Quick change-over for short runs. All meters are enclosed, yet easily accessible.





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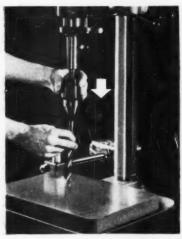
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Change tools in seconds with this FULLY-AUTOMATIC CHUCK

no keys...collets...or wrenches



SPINDLE NEVER STOPS



HERE'S ALL THERE IS TO CHANGING TOOLS

TO OPEN – Grip Sleeve – pull down – jaws open automatically – tool is released.

TO CLOSE - Insert new tool - push up tapered part - tool is locked in place.

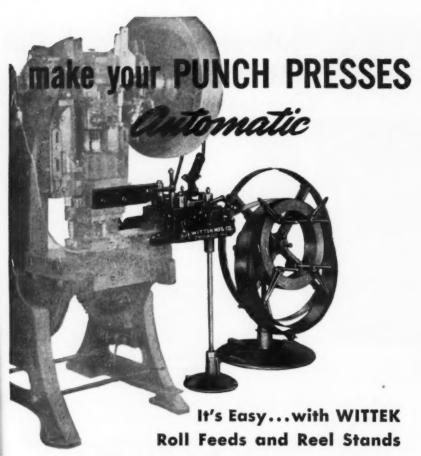
SAVE TIME—Change tools with spindle running...no keys, collets or wrenches needed. Ideal for fast, uninterrupted production.

SAVE MONEY—One spindle does the work of several. Smooth, hardened and ground jaws grip tight without chewing tools.

IDEAL FOR—Precision drilling or for spotting, drilling and reaming in boring or milling machines; in lathe work for burring, turning and filing.

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Wittek Roll Feeds handle any type of coiled strip stock and are made in single roll, double roll, and compound types with straighteners, in models to feed in any of four directions. They are reliable and accurate with simple, quick adjustment of feed length. Standard sizes and models meet a wide variety of press size and capacity conditions.

Wittek Reel Stands facilitate handling coiled stock.

Write for full particulars

WITTEK Manufacturing Co.

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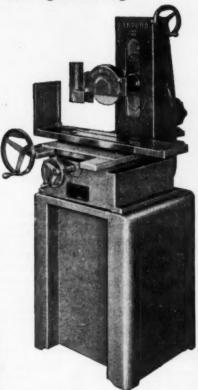
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SURFACE GRINDER for WET or DRY grinding

HAS THE "FEEL"

- Looks well.
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CAPACITY: 834" transverse, 13" longitudinal, 12" vertical under 7" dia. Wheel with Adapter. Meehanite Castings for sturdy construction, (weight appr. 630 lbs.) Vibration-less operation and long life. Does form grinding by crush method and finishes to dependably superior accuracy.



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Rugged tool head locks in any position.



Graduated eccentric for stroke adjustment.



Guards on all belts and pulleys.



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It's fast—accurate—easy to operate. This shaper can consistently give you low machining costs on small parts. Its use will release your large shapers for heavier work, save on machine investment, power and maintenance. Send coupon for literature.

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RAM — Stroke length — 0 to 7". Strokes per minute (4) — 42 to 195.

TOOL HEAD — Feed – 3". Rotation – 360°.

TABLE — 9½" horizontal travel, 5" vertical.

Power cross-feeds (6) – 002" to .012". Clears ram — ½" to 5½".

VISE — Jaw width — 4". Jaw depth — 1".

Maximum opening — 4". Swivel base.



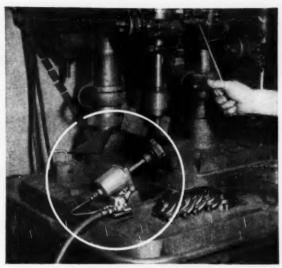
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Company

Simplify any work-holding problem





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Watch a worker making ready for a simple drilling operation. You'll find he takes as much as ten seconds just to grip the work tightly.

You can eliminate most of this lost time with the new Schrader ClampAir. What's more, the ClampAir takes no more effort than opening a valve.

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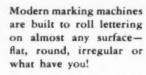
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You can drill 2 to 8 holes at one stroke of a MULTI-DRILL equipped drill

press. Instantly and easily adjusted

to any hole pattern . . . compact in design and ruggedly built for years

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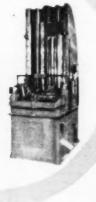
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50 YEARS IN BROACHING / We're the eldest in the world . 1962 - GOLDEN ANNIVERSARY - 1952 You don't need to advertise for more skilled operators to meet extraordinary production schedules... when you're equipped with Lapointe Broaching Machines and Broaches.

That is why, with the baffling shortages of skilled workers, many production men are taking time out in the midst of emergency programs to investigate Lapointe broaching, for insurance against future man-power shortages. Through broaching you are assured of repetitive accuracy, together with remarkable production speed.





LAPOINTE

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Double Rom Vertical Broaching Machines. Write for Sulletin DSV-7.

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MACHINE TOOL COMPANY

HUDSON, MASSACHUSETTS . U. S. A.



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THE NEW No. 2 MODEL A

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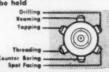
HIGHER PRODUCTION WITH GREATER ACCURACY AT LOWER COST PER PIECE MACHINED

The No. 2 Model A BURGMASTER will definitely cut your second operation costs because: Loss of time due to movements of parts from one spindle to another are eliminated; Clase tolerances an size and concentricity are easily maintained; Set-up is simple and fast—unskilled operators can run the machine; Less floor space and power required; Rigidity, power and spindle speeds permit the use of high cutting speeds; Naw equipped with Warner electric clutch units in speed change mechanism.

- * %" Drill Capacity
- * 1/2" Top Capacity
- 1 to 2 H.P., 2 speed, 3 phase, 60 cycle Meter
- 12 Spindle Speeds, ranging from 225-3000 R.P.M
- 4 Speeds, pre-selective per spindle, at any one setting
- 8" Rom Food
- 19" Table Travel
- Throat Depth-11-5/16"
- Spindles Mounted on Class "O" Timken Bearings

Write teday for detailed information.

- * Power Index, utilizing Geneva Mechanism
- Individual Depth Stops
- * Completely Enclosed Gear Box
- * Table work surface-17"x33"
- Approximate weight-- 1650 lbs.
- * Floor space required-36"x48"
- Extremely close tolerance can
- be held





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TYPE G MILLER — a precision-built all-geared milling machine. Ideal for both tool room and production milling.



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FIVE OF THE COUNTRY'S LEADING jet engine producers are using Nebel lathes proudly and profitably. One Detroit jet manufacturer remarked, "we are very pleased with the lathes and are amazed that you can sell at the price you do!"

AND THAT'S REPRESENTATIVE OF the warm reception given Nebel lathes everywhere. They're basic, dependable, heavy duty lathes, built to do big work at little cost. A Nebel's a natural . . . truly the workhorse of the shop.

BUILT IN THREE MODELS: engine, removable block gap and extension bed gap... in swing sizes from 18" to 50". There's a size and type for your requirements, too.

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28'/50' NEBEL '6' SERIES extension bed gap lathe machining compressor rear frame for a jet engine.

TYPICAL COMMENTS HEARD AT ASTE SHOW ABOUT WALES DRILLING MACHINES

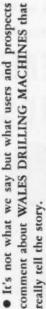




Showing the 2 built-in "Scan-A-Scales" that accurately locate drill head and slide rail for "zeroing in". Air locking clamps hold the work rigid during drilling oper-



Showing a hole in the work being reamed by simply interchanging the drill and bushing with corresponding size reamer and reamer bushing.



Wales Drilling Machines are specially designed, precision engineered and accurately constructed to meet the close tolerance requirements of locating, drilling and reaming holes in material of practically any length and up to 36" wide. There is no other drilling machine or jig borer like it.

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WALES-STRIPPIT OF CANADA LTD., HAMILTON, ONTARIO

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$Also\ investigate\ { t THE}\ { t BLANCHARD}\ { t CYLINDER}\ { t WHEEL}\ { t HOLDER}$

This new device eliminates sulphuring and thus reduces downtime. It's a real time, money and trouble saver. Grinder head is merely lowered onto wheel — clamps quickly secure the wheel — you're ready to grind! Available for 10", 11", 16", 18" and 20" Blanchard Wheels.



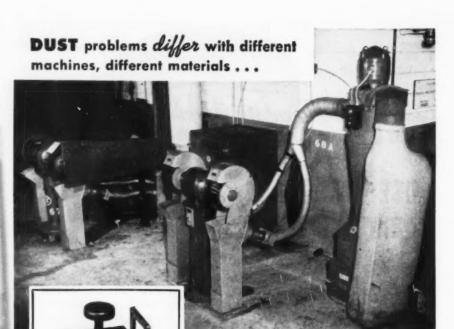
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The sturdy and efficient door fastener used on Torit cabinets is available for use on your own products. Strike plate either flat or angular. Write for prices. ALL CAN BE SOLVED WITH CABINET OR CYCLONE TYPE

TORIT
DUST COLLECTORS

Here adjoining machines present differing dust collecting problems. At the left is a belt grinder with its metal and abrasive particles. Its dusts are eliminated by a cabinet type Torit Dust Collector.

At the right a cyclone type Torit Dust Collector efficiently handles the lint and dusts from a double-end, 12'' x 5'' wheel, polishing stand.

Torit manufactures cyclone and cabinet type dust collectors in many models, so that the best for your particular problem can be put to work for you. Write today for complete information and latest Torit catalog.

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fusol outcools, outproduces ALL OTHER COOLANTS

You can get far greater production from your shop, and you can do it without adding a single machine or tool or man, simply by switching to Lusol. You can prove these facts about Lusol to your own satisfaction in your own plant—just as thousands of others have already done.

Lusol is a clear, all-chemical concentrate that is diluted with water and used in the coolant system of almost every type of machine tool-lathes, grinders, milling machines, saws, broaches, even rolls and presses. In each of these operations we have cases of increases in tool life as high as 500% and even higher. Less down time for tool dressing means greater production. Work stays cooler because Lusol is a supercoolant. Oilless Lusol reduces the surface tension of water so it penetrates to the very cutting

edges of the tools, keeps grinding wheels from loading up.

Workers like Lusol! A mild combination of chemicals, milder than most toilet soaps, Lusol by itself can't become foul smelling or cause dermatitis. Workers' hands, clothes and the surrounding floors stay clean and non-oily. Frequently, parts made with Lusol need not be degreased before painting, plating or assembly. While not a rust preventive, Lusol reduces the possibility of rust on parts that are stored between stages of production.



FREE BOOK

Get complete facts about Lusol by writing for this 20-page booklet. It contains information on machine cleaning, maintenance of Lusol solutions, elimination of dermatitis and odor In machines, plus many case histories of Lusol at work. Write F. E. Anderson Oil Company, 217, Portland, Conn.



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"HARD TO FIND TOOLS FOR STOCK DELIVERY"

Why Wait for SPECIAL TAPS? we have them in STOCK for IMMEDIATE DELIVERY

HIGH SPEED

SPECIAL RIGHT HAND TAPS



THREAD	SIZE	THREAD	SIZE	THREAD	SIZE
8-10-12-14-	1-3/4	12-16-18-20-27-28-32-36-40-48	3/8	32-48-00-64	4
16-18-20-24		12-16-18-22-24-27-28-30-32-36-	7/18	30-32-36-48-	5
8-10-12-14-	1-13/16	48	4/10	80	
16-18-20		12-14-16-18-22-24-26-27-28-30-	1/2	36-40-48-56-60	6
8-10-12-14-	1-7/8	32-40	1/4	32-40	7
16-18-20-24			9/16	24-39-36-38-	8
8-10-12-14-	1-15/16	16-20-24-27-28-30-32-40-48	5/8	40-44-48	
16-18-20-24-29		12-14-18-20-24-27-28-32-36-40		24-28-32-48	10
12-16-18-20	2	11-16-18-20-24-27-28-30-32	11/16	28-39-38-40-	10
12-14	2-1/16	9-11-12-14-18-20-24-26-27-28-32	3/4	48-64	12
12-16-29	2-1/8	10-14-18-20-32	13/16	20-24-18	14
12-16	2-3/16	10-12-16-18-20-24-27-28-32	7/8	68-64	1/16
4-1/2-8-12-	2-1/4	8-9-10-12-14-16-18-20-24-32	15/18	72	5/84
14-16-18	4-1/4	10-12-16-18-20-24-27-32-40	1	48	3/32
12-18	2-5/18	12-14-16-18-20-24	1-1/16	48-58	7/64
12-16-18	2-3/8	8-10-14-16-18-20-24-32	1-1/8	32-40	1/8
8-10-12	2-1/2	8-10-12-14-16-18-20-24	1-3/16	32-36-49	5/32
18	2-9/16	8-10-14-16-18-20-24-32	1-1/4	36-40	9/64
12-16-29	2-5/8	12-14-16-18-20-24-32	1-5/16	36	11/64
16	2-3/4	8-10-14-16-18-20-24	1-3/8	20-24-32	3/16
8-12-16	2-7/8	8-10-12-18-18-20-24	1-7/16	32	13/64
8-16	3	8-10-14-16-18-20-24-28	1-1/2	24-28-32	7/32
8-12-16	3-1/4		1-9/16	18-24-26-27-	1/4
8-12-16					8/18
8-12	3-7/8				3/16
8	3-1/2 3-7/8 4	18-20-24 5-1/2-8-10-12-13-16-18-20-24 10-12-14-16-18-20-24	1-9/16 1-5/8 1-11/16	39-32-36-40 16-20-22-27- 28-32-40	5/16

HIGH COFED LEFT HAND

	111011	SILLD LLII	HAND IAIS
SIZE	THREAD	SIZE THREAD	SIZE THREAD
0 1 2 3 4 5 6 8 10 12 1/4 5/16	80 56-64-72 56-64 56 32-38-48-48 40-44 32-36-49 32-38-40 24-39-32-40 24-28-32 18-20-24-28-33 18-20-24-28-33	3/8 16-24-32 7/16 14-20-28 1/2 12-13-20-28 9/16 12-18-20-24 5/8 11-12-18-20-24 1/16 11-18-24 3/4 10-16-18-20 1/8 9-12-14-16-18-20 1 8-12-14-16-18-20 1-1/8 7-12 1-1/4 7-12-16-18	1-3/8

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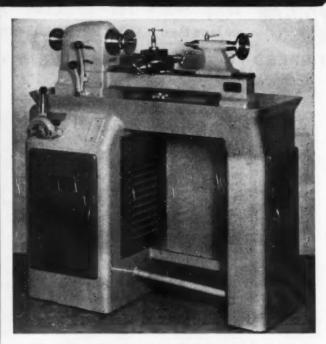
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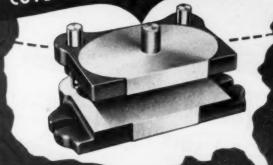
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- · Three shelves are provided on right hand side.
- Collet board is on left hand door, below the convenient centralized controls.
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Your "Detroit" Die Set man knows die sets. Call him in . . . talk over your die set problems with him. Get from him full facts about the accuracy of "Detroit" parallel surfaces, the trueness of pins, the fine finish, the thorough inspection at the factory. You'll see that "Detroit" leaves nothing undone to assure easier mounting and longer production runs. Call your "Detroit" man.

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PITTSBURGH	. LO 1-4011
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ST. LOUIS	. FR 6811
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GISHOLT'S easier operation



saves you time and money ...

This 21,000 lb. machine requires no more operating effort than turret lathes 1/3 its weight. Despite its great power and rigidity for heavy-duty work, the new Gisholt 4-L is so fast and responsive, it can handle light work of both large and small diameters. With many machine functions entirely automatic, waste time is eliminated. Fatigue is reduced to a new minimum. Training time is shortened. Operator output is faster-more nearly constant throughout the day.

Hydraulic Speed Selector eliminates manual gear shifting. Spindle speed changes are made instantly by power without stopping the spindle or releasing the main drive clutch. Can be operated either direct or pre-set.

> Central control panel eliminates manual effort. Provides responsive finger-tip, push-button control for start, stop, reverse, inching, chucking, and coolant supply. Automatic braking brings the work smoothly and quickly to rest.

> > Easy selection of feeds is provided in the new single dial type feed selector control, making a complete choice of feeds immediately available. Aprons are fully enclosed. Automatic lubrication assures easy movement of carriage.

The new Gisholt 4-L Saddle Type Turret Lathe provides 31%" swing over the ways, 27" swing over carriage wing, 91/2" to 121/2" spindle bores and 63" longitudinal working travel of turret carriage to accommodate an unusually wide range of work. Ask Gisholt engineers about this modern, easier operating Gisholt as applied to your specific machining requirements. New literature is available.



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represents the collective experience of specialists in the machining, sur-face-finishing and balancing of round and partly round parts. Your prob-lems are welcomed here.

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Lighter... faster Rotor arinde

TYPICAL RESULTS OF BRIGHT, SCALE-FREE WORK THE "IPSENWAY"



1. CLUTCH PRESSURE PLATE Carbonitrided, 500 per heat, to case depth of .005" -- .007" in cycle time of 60 minutes.



2. BREATHER VALVE SEAR Carbonitrided, 250 pieces per heat, to case depth of .010" — .012" is cycle time of 95 minutes.

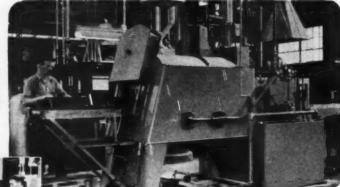


3. FENDER MINGE SEGMENT Carbonitrided, 750 pieces per heat, to case depth of .010"— .012" in cycle time of 90 minutes.



A. BOLLER TAPPET ASSEMBLY Carboniteided, 800 pieces per heat, file hard case, in cycle time

PRODUCTION SHORT-CUTS in Heat Treating



View of Ipsen T-250 Unit in operation at Harley Davidson. Loading door is hydrawlically operated by foot pedal. Trans are transferred from heat through intermediate door into quench or cooling chamber automatically.



Illustrated above are typical heat treating results obtained by Harley Davidson Motor Co., Milwaukee, in processing parts automatically in a standard Ipsen Heat Treating and Quenching Unit. Individual methods are applied for each part to suit material and depth of hardness desired. The operation in the Ipsen is automatically controlled from heat through quench (or cooling) so that highly uniform, dependable results are obtained from batch to batch.



Acid Cleaning and Extra Handling Eliminated

Because each load is heat-treated at a uniform temperature and in a controlled and sealed atmosphere condition, the work comes out bright and scale-free. This, in turn, eliminates acid cleaning operations and extra handling. In addition, clean working conditions prevail, and unskilled operators can be quickly and easily trained to tend several units simultaneously. Investigate this modern, simplified method of heat treating today.



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Ask for free bulletins and find out how Ipsen Units can be applied to sesser week. If you wish, samples of your work will be run, procedure: established, and production estimates made without obligation.



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Production units for CARBONITRIDING - CARBURIZING - MARDENING - BRAZING - MARTEMPERING

Lighter...faster Rotor grinders "PAID OFF" in 48 days

JOB: Grinding welds on truck cabs. Using slow, 20-pound electric grinders. Only 2800 r.p.m. under load.

SOLUTION: Rotor Application Engineer suggested changing to Rotor 6" Air Grinders that weigh only 9% pounds. Speed 5300 r.p.m. under load.

RESULTS: Stepped up metal removal,

increased wheel life. Lower maintenance. Cut man-hours per cab. Savings "paid off" cost of Rotor Grinders in 48 days—on basis of 50% use factor.

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AIR O'TOOL



LIGHTER... Unique two-blade design and magnesium handles. Easy to move around. 6" Rotor Grinder weighs only 9¾ lbs.. 8" only 11¼ lbs.

FASTER... Rotor Grinders, known as the "Power Plus" line are recognized everywhere for their high speed under load.



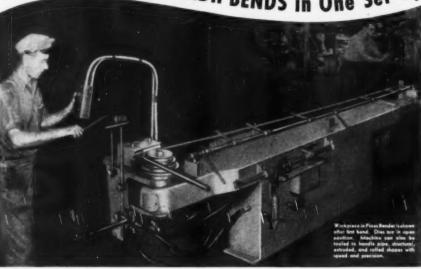
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THE ROTOR TOOL CO

CLEVELAND, OHIO

HIGH

Forming MULTIPLE RADII BENDS in One Set-Up



HOW A PINES AUTOMATIC BENDER Speeds Production at Randall Company

The Pines Automatic Bender set-up illustrated here is one employed by The Randall Co. of Wilmington, Ohio, to speed production of truck seat frames requiring six bends of three different radii. The machine and tooling, designed and built by Pines, forms the complete frames on one machine. Operations are performed in sequence with a triple die set-up. Tool changes are eliminated, and daily production maintained at an average rate of 240 bends per hour.

Machine is push-button controlled and hydraulically operated — is adaptable to a wide range of production bending jobs, handles serpentine, coil, compound, and multiple bends without marking or distorting. Complete range of sizes for light or heavy work are available.

When you have a production bending problem, call on Pines Engineers for assistance. Chances are they can also help you save time and cut costs.



FREE DATA SHEETS

Write today for free copies of "Pines News" illustrating and describing bending and tooling techniques on actual jobs.

PINES ENGINEERING CO., INC.

Specialists in Tube Fabricating Machinery

BENDING - DEBLERING - CHAMPERING - THREADING MACHINERY





Close-up of pressure and clamping die in open position ofter completing fourth band. For each radius operation simply positions stock in proper proves of triplet Planes of hands are determined by floor mounted strates.

492 WALNUT . AURORA, ILLINOIS





The Gisholt Hydraulic Automatic Lathe is a genuinely rugged 12" lathe, suited for light, fast jobs. Handles chucking, between centers, or fixture-held work.

THE GISHOLT ROUND TABLE

represents the collective experience of specialists in the machiming, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

GREATER ACCURACY

Here, feed pressures are applied directly to tools without intermediate cams, arms or other linkage. Accuracy is further insured by feeding against dead stops. In all cuts there is a moment of dwell during which cuts are cleaned up.

Front carriage is mounted on and driven by the massive bar to which it is clamped. Wide lateral support of carriage assures rigid alignment without tremble or tremor.

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Both carriages are directly supported by the massive integrally cast cabinet type bed, and all bearing surfaces, ways and gibs are hardened and ground steel to assure permanent accuracy.

GISHOLT....

Madison 10, Wisconsin

Boyar-Schultz

No. 2 PROFILE GRINDER

A standard machine tool in die shops and in tool rooms where grinding odd shapes and diffi-

cult, irregular contours is necessary.

It is a particularly useful machine for grinding and fitting large dies and punches such as forming dies for refrigerators, table tops, sanitary ware and in automotive and aircraft shops.

Spindles in dual spindle model illustrated, turn at 10,000 RPM: stock removal is rapid even with small diameter wheels. Uses wheels 1/4" to 3" in diameter.

No. 1 Profile Grinder

A bench model with spindle speed of 20,000 RPM. Performs in minutes, many jobs that would ordinarily require hours. Uses wheels 1/8 to 1" diameter.



OYAR-SCHULTZ

2108 WALNUT STREET, CHICAGO 12, ILL.

WRITE FOR LITERATURE FULLY DE-SCRIBING THESE TIME SAVING MACHINE TOOLS

Featured in this issue

Engineering Can Cut Costs and Increase Production for Smaller Plants 162 Titanium, Report on Cold Forming and General Machinability 184 Special Report on Drilling Machines 210

Engineering Can Cut Costs and Increase Production for Smaller Plants, by Frank William Miller, explains some of the pitfalls the small plant that fails to invest in engineering may find itself in as the size of the establishment grows. This vice president of the Yarnall-Waring Company also has some excellent advice on ways for the small plant to increase its production without increasing floor space. In this discussion he points out definite examples of savings dealing with (1) Machine tools; (2) transportation engineering; (3) tool engineering; (4) methods engineering; (5) material engineering; (6) engineering specifications: (7) research tasks. Page162 Titanium. Report on Cold Forming and General Machinability by James Joseph, takes the reader into the future regarding this up and coming metal that threatens to replace stainless steel in many fields. However, this problem child of the machinist has always offered a challenge with its work hardenability. Joseph gives latest developments in machining methods. Page

Hydroforming, A New Method of Deep Drawing Simple or Intricate Shapes, explains this unique principle of The Cincinnati Milling Machine Co., where a solid punch member moves into a flexible, hydraulically pressurized die member. Page

Red e

INDEX CHUCK

with Air Operated Collet

Uses Brown & Sharpe type collets. Capacity: 1/16" to 2".

No. FC-28

V-29





Air Foot Control
and Valve



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AIR CHUCK

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BOX 247

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at the fundamentals at setting up a job and requires a specialist's experience. Characteristic of the design of all STURDIMATIC LIVE CENTERS is a low overhang and a slight cushioning action that compensates for expansion due to heat shock and excessive thrust loads—reducing wear to a minimum. Send us your blueprints and specifications—we will see that your job is set up with the right Live Center. Standard shanks with Morse taper carried in stock.





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Oil-hardened tool steel tapered pin gages accurate to +0.0001"-0.0000" insure dependable sizing and location of holes and slots for machinists, setup men, tool and die men, inspectors, all who need precise hole measurement.

CONCENTRIC TAPER on lower half of each gage fits holes 0.0012" smaller

than standard letter, fraction, and number size drill holes. Makes insertion easier. Permits gaging of odd-size holes and slots.

ALL GAGES are 1½ inches long. Sets contain a pair of each size in a plastic case with 4-place decimal equivalents of each size plainly marked.

ALL ITEMS STOCKED FOR IMMEDIATE DELIVERY

GAGE COMPANY THE 21 STAPLES ST., BRIDGEPORT, CONN. Quantity Please Rush checked items and literature to Letter sets @ \$45. 52 gages (A-Z) Fraction Sets @ \$50. 60 gages (%" to 1/2" in 1/4" steps) address Number Sets @ \$90. 120 gages (1 to 60) Single gages @ \$ 1. Stand alone @ \$10.



Working on rocket motors at Aerojet-Division of The General Tire & Rubber Company, this versatile 4' 9" column Cincinnati Bickford Super Service Radial is economically drilling and tapping in type 347 stainless steel.

Class 3 fit is required on the tapping operations of these 1/2" x 20" and 310" x 24" holes.

In this unusual installation a 12-foot pit permits processing of large work in vertical position, while another piece is set up on large V-block fixtures on plain box table.

The centralized controls clear view Bickford Head, and wide selection of speeds and feeds all bring ease and economy on this job.

Write for Booklet R-21-B.

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AS THE Editor SEES IT

This kind of inefficiency is expensive.

"Production without safety is inefficient. Accident prevention is absolutely an essential part of the industrial grogram." This was said by Henry Ford, the young fellow who ran a shop in Detroit where he made automobiles. Because he operated a successful shop it might be said he knew what he was talking about. In fact, total time lost through accidents in 1950 amounted to 275,000,000 man-days; total cost of this loss of manpower was \$2,500,000.000. This is very costly inefficiency indeed!

Even though the figures just quoted are appalling the steps taken toward reducing industrial accidents have been giant-sized. In 1926 the frequency rate of accidents was 31.87; in 1950 it was down to 9.30. The severity rate was 2.50 in 1926; in 1950 it skidded to .94.

This progress speaks highly of the cooperation between workers and management. This teamwork is essential to any accident prevention program and further accidents will, and can, be reduced in direct proportion to the joint efforts of workers and management.

Unfortunately, there are too many shops in this country who don't mind spending a small fortune for the cost of accidents, or who are so efficient that a couple of

thousand manhours lost now and again are of little consequence. Many workers and businesses just don't care about instituting an accident prevention program. If the economic aspects of accidents do not appeal to these shops it is doubtful if the humane side of accidents—the suffering and grief which is part and parcel of every accident-will carry any more weight. How these shops can be made safety conscious is a problem which has concerned safety councils and insurance companies for years. To be sure, an effort of a sort is made to provide worker protection, but accidents are not prevented by action "of a sort." Safety is everybody's job, and everybody's got to work at it, today, tomorrow and every day. No matter how much money is spent on mechanical safety devices for men and machines, in the long run the money will come back to the business in one form or another, and likewise return to the worker in one form or another.

To go into a safety-conscious plant—a plant where workers and management labor long and diligently to make safety second nature—is a delight. Here adequate protection of moving parts, good housekeeping, workers' safety equipment, proper working conditions pay big dividends in increased production, and in decreased costs.

William 7 Schleicher

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- 12" TO 50" SWING 4' TO 100' BED LENGTH

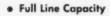
Here's your guide to better, faster turning by LeBland. It describes LeBland's complete line of lathes. Write today for Catalog J.

OND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO



with Ross Full-Flo In-Line Value you get Full Pipe Capacity!

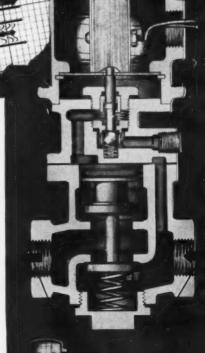
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- Positive Seal
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- Low First Cost
- Low Operating Cost
- Low Maintenance Cost
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tions interchangeable on all 24 Ross-In-line Badies

ROSS OPERATING VALVE CO.



on a revision of Order M-41. A complete rehabilitation is in the works; even those engaged on the job don't know much about details.

In NPA they tell you machine tool folk who are out of rated orders have difficulties ahead. Incidentally, they will tell you the business as a whole has been geared beyond over-all requirements. As they see it, the cutbacks or the stretchouts, or cancellations, or what you may call them, have precipitated a situation that NPA can't immediately remedy. They think there is plenty of non-military business, and that this civilian business should be classified properly so as to give the orders the proper rating. These problems of excessive business in one place and not enough in another are some of the troubles some of the very sincere NPA people are trying to solve.

Deputy Director Lincoln Love of the NPA Metal Working Machinery and Equipment Division came here January 1, 1952. According to custom, he was due to go back to his job in the Engineering Purchasing Division of the Ford Company in Detroit on July 1. But the difficulty of getting the right men from industry to come to Washington under present circumstances will keep Love here at least until August 1. His successor is not yet in sight. Love, personable and vigorously active, is particularly needed now because Ralph S. Howe, the new NPA Metal Working Machinery and Equipment Division Director is still new on the job.

Senator Fulbright, (D., Ark.), wants terms of Walsh-Healey Act changed so that minimum wage scales, in filling Government contracts, may be determined locally rather than on a nation-wide basis. The change particularly is important to the South. AF of L and CIO and other labor champions are violently opposed.

U. S. Supreme Court ruled employer may legally have "management functions clause" in Union contracts giving management final decision on various phases of employment conditions, including hiring and firing, arbitration, promotion, demotion and work scheduling. . . Productivity discussion apparently was uninteresting to most elements involved. At hearing only three WSB members showed up, and CIO and AF of L were represented by lobbyists. There were no industry witnesses. U. S. Labor Department supplied 98% of the witnesses. . . . WSB Chairman told House Labor Committee WSB would end wage controls where eight or less workers are employed. There will be some exceptions not yet defined; nor has the exact time been indicated.

ceilings on used machine tools and used machine tool extras. The action extends geographic coverage of CPR-80 to include sales in Alaska and Hawaii, and requires a guarantee to accompany sales of reconditioned items. New provisions are set forth in Amendment 1 to CPR-80, effective June 2, 1952. CPR-80 provides a schedule of percentages covering machine tools of various ages and conditions. To establish the ceiling the seller applies the appropriate percentage to the January 25, 1951, list price for the most comparable new commodity. The amendment substitutes manufacturers list price of December 15, 1951. Table of percentages has been altered accordingly.

July, 1952

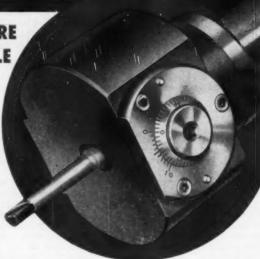
MICROBOR E

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This Boring Head is adjusted rapidly and accurately by means of proven micrometer Vernier arrangement. The tool slide can be adjusted in accurate increments from zero to ¼" off center. With a standard set of boring tools, bores ranging from ¼" to 1" diameter can be machined. The boring head can be furnished with straight, taper, or flanged type shanks to suit any make of boring machine.

Manufacturers Representatives: A few desirable territories are open to qualified representatives. If interested please write for details,



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land, Germany and some other countries. Sixty-nine castings ranging from fifty to one hundred fifty tons, were ordered. . . . DPA announced as a basic policy, defense funds should not be used where expansion can be obtained by other means. This particularly applies to RFC. . . . Seventy-two regional CIO Directors spent two weeks, and more, in Washington to apply vigorous personal pressure on Senators and Representatives, whom they personally visited, to support all labor measures. Finally they called on Truman.

... Government economists declare 33-1/3% of the nation's total business springs from the defense build-up. . . . We are told here civilian industry retooling immediately ahead has greater promise for machine and tool industry than any time since 1945. Shipments 157% greater during first quarter. Particular activity in re-tooling for new production of television, household appliances, and particularly automobiles. Cost is reported two-three times higher than a few years ago.

Henry H. Fowler, June 1, succeeded Manly Fleischmann as Defense Production Administrator. Fleischmann was here two years. Fowler, a Government career man, as NPA head, is subordinate to Commerce Secretary Sawyer; as DPA head he reports to Steelman and the President. Only a trained Government career man can agreeably do this balancing act.

Fleischmann's passing led ODM Steelman to establish, under Fowler, an ODM Inter-Agency Committee on Production Policy. They also call this the Advisory Committee on Production Equipment. It is expected to be very valuable to the machine tool industry. Carl Vance is the dynamo of the unit. The Committee defines its job as advising ODM how to get the most out of continuing defense production; reviewing all policies, plans and programs; reviewing and formulating all proposed legislation and Executive Orders and Administrative orders and regulations relating to production. If, as intended, the Committee is permitted to function according to the blue print outline, it will be one of the most powerful Agencies of the Government. We are advised to watch it. It is composed of Representatives of the Departments of Defense, Interior, Commerce, Agriculture, Labor; the Defense Production Administration, the Defense Materials Procurement Agency, the Atomic Energy Commission, the Defense Transport Administration, Economic Stabilization Agency, the National Security Resources Board and the Mutual Security Agency. The move is an effort to supply the strength and power that vanished with Wilson.

Central Inventory functions of Defense Department have been transferred to NPA Metal Working Machinery and Equipment Division. This is the unit which has attempted to mobilize machine tools scattered variously all over the U.S. Teams have been sent out to make an inventory of machine tools in warehouses and with military contractors, schools and other places, wherever they may be. 'Tis hoped many machine tools, present wereabouts unknown, will be located and put to work.

There is a new Program Expedition Division in NPA, working

LAST MINUTE WASHINGTON NEWS



by Arnold Kruckman Washington Correspondent



Washington, in the know, says mobilization has gone awry more since Wilson quit. Pentagon is considered stupid and blundering without strong competence to exert control. Truman reported to be hunting a strong man to take over, but unsuccessful in the light of Wilson's experience; at this writing, June 1, U. S. Supreme Court decision on the steel seizure is regarded as a profound potential in shaping the future of the nation.

Purchases by Federal Government of machinery, which includes items of interest to the machine tool industry, for the four weeks ending May 14, totaled \$89,666,000. Principal procurement was done by Army, Navy, Air Force, and by the Navy Bureau of Ships. Principal purchases were engine assemblies, engine parts, boiler parts, turbine parts, milling machinery, headers, pumps and pump parts, ball bearings, typewriters, fork trucks, drilling machines, turret lathes, stencil-cutting equipment, handling equipment, shovel parts, dishwashing machines, valves, ice plants, Diesel engine parts, tractors and parts, and gate valves. This information is pertinent because Government promises speeding up of defense procurement, and Government also urges attention to the fact that civilian industry is encouraged to re-tool to produce new types of outmoded appliances, cars, and other civilian goods.

W. H. Wiewell, Assistant Administrator, Metals and Minerals Bureau, NPA, urges substitution to conserve critical materials. He suggests chrome steels for nickel steels, silicon bronze and tin-bearing bronzes for nickel and monel items; zinc for cadmium, and aluminum for zinc. Aluminum, more plentiful, was suggested for copper and brass. Plastics and forest products are suggested in place of metals. . . Wiewell says it's dangerous to predict which critical metals will be decontrolled first. Wherever there is softness in the foreign metal markets, a la lead, similar relief will be provided in other metals.

To speed construction of giant presses, castings have been ordered in European foundries by Air Force, DPA and NPA, on urging of Mutual Security Administration. Foundries were found by teams sent to explore in France, Belgium, Britain, Switzer-

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PRES-ON Abrasive Discs are used on all types of grinders and rotary power drills. Each PRES-ON Disc is made of resin bonded abrasive cloth with pressure sensitive adhesive on the back for instant application and removal. They are used with PRES-ON Flexible Disc Holders that are made of soft flexible rubber which is capable of conforming to severe contours without digging. ON YOUR NEXT ROUGHING AND FINISHING JOB TRY "PRES-ON!"

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 AND ANY CONTOURED
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Send for Descriptive literature and price list on PRES-ON DISCS. Discs are available in ½" thru 20" diam., grits 16 to 600 mesh.



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● The operator can slide the switch around the floor to wherever handiest to use. A mere touch of the toe and the knife is set in motion. Electric toe control is standard on all Steels weld Shears and furnished at no extra cost. It enables shearing speeds not attainable with ordinary foot treadles for many cutting operations.

• If you have spent a day at a shear with the old mechanical foot treadle, you know what knee action is. As the hours roll by it grows more and more tiresome, latiguing, and production slips accordingly.

At last something has been done about it. Electric foot switches have been adopted as standard equipment for Steelweld Shears. Knee action has been replaced by fast easy toe control.

Toe control is one of many outstanding features you get on Steelweld Shears. These machines are in a class by themselves. Learn what they can do for you.



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How's Business



Business

Conditions are generally spotty throughout various industries. Responsible sources give sharply conflicting reports. One source says business boom is stirring to bloom in November to elect Democrats by means of new doses of inflation. Another says that business volume has sunk to a twenty-five month low. This authority blames strikes in basic industries.

Freeze of consumer spending has been attributed to long-term purchase contracts on autos and houses, and excessive taxation. All government analysts say trend is upward, with more government spending, and more anticipated consumer spending. It is also reported that U.S. corporations are expanding their financing in manufacturing and utilities; however, many investors are putting their money in institutions rather than in risk enterprises.

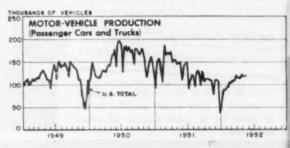
Purchasing Agent's Association and National Industrial Conference say general production was going down in May, inventories cut to half, and industrial purchasing on a hand-to-mouth basis. They predict this will continue until September. One Washington agency re-

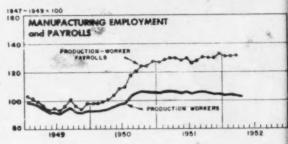
ports warehouses have \$70 billion worth of unsold goods, and many are selling on memorandum.

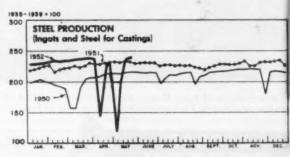
Higher allotments

General business indicators

source: U.S. Dept. of Commerce







Higher allotments of controlled materials will be made available to manufacturers in the third quarter of 1952, NPA announced,

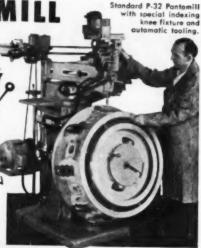
GORTON PANTOMILL

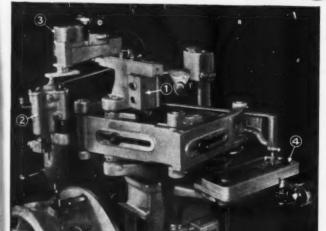
Solves Complex Profiling Problems with Automatic Cutting Cycle

PROBLEM: Profiting eight ports in outside portion of aircraft part, a large aluminum-alloy casting. The sides of each port are parallel; one end has a true radius, the other end is parabolic.

SOLUTION: Gorton P-32 Pantomill profiles all eight ports at the rate of 2.3 minutes per port. Cutting cycle is automatic; indexing is manual.

This is truly a power-driven tracercontrol job that would require hours if done by a combination of other methods.





Here's How It Works

Complete cutting cycle begins when "start" button is pressed.

Air cylinder automatically feeds cutter down to cutting position. Cam-operated spindle down feed then takes over. Upon completion of cut and after spindle retracts, this air cylinder further retracts cutter for clearance.

Speed of spindle down feed during cutting is controlled by cam through a Variac.

Motorized chaindriven master starts automatically when "start" button is pressed.

This is just one of many Gorton tracer-controlled production short-cuts which might save you time and money. For complete information, clip and mail the coupon now.

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A 7133-1P-A

Allotments for all household durable goods will be above current levels, some will be substantially higher. Aluminum will be increased to 45% of second quarter base, and the general level of copper will be raised 10%.

The minimum level of brass mill and copper foundry products will go up from 10 to 20% of base period consumption. Additional materials above the quantities granted to supply civilian demand will be provided to enable manufacturers to fill military orders and to make repairs.

Substantial amounts of steel and aluminum, and some copper, have been set aside for distribution as supplementary allotments and NPA advises manufacturers who find their third quarter allotments will work hardship to file supplementary applications immediately. Applications will receive consideration in the order of their arrival.

SDPA

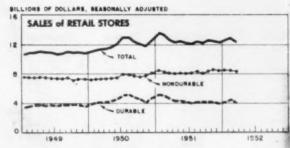
Fifty-five loans totaling nearly \$6,000,000 were made to small business firms on recommendation of the Small Defense Plants Administration during the period ending the middle of May.

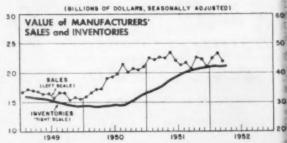
New applications for small business loans are now coming in at an increased rate, reflecting growing interest by small firms for increased participation in defense and defense supporting production. In cases where private financing is not available, small business loans are available to help finance both defense and essential civilian production, up to a statutory amount of \$100,000,000 outstanding at any one time.

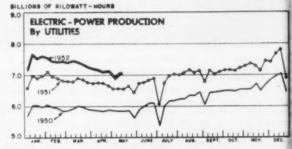
Since the first application for a small business loan was received by SDPA last

General business indicators

source: U.S. Dept, of Commerce







December 26, more than 600 applications have been received. Of these, 77 have been denied and 66 withdrawn. In many cases the applications were withdrawn because financing was arranged through other channels.

Machine tool orders

For the first time in some years shipments of machine tools topped new ma chine tool orders during April, according to the National Machine Tool Builders'

Index of new orders and shipments of machine tools

source: National Machine Tool Builder's Association

Month	Domestic	Foreign	Shipments	Orders to Demonstrated Production Rate

Apr.	516.1	66.1	157.7	20.4 - 1
May	483.0	35.7	175.1	20.1 - 1
June	558.8	56.4	182.8	20.9 - 1
July	490.6	54.9	144.7	22.0 - 1
Aug.	488.9	58.7	178.9	22.8 - 1
Sept.	380.2	27.0	189.8	23.5 - 1
Oct.	403.8	41.1	221.3	22.2 - 1
Nov.	330.5	29.0	226.0	20.3 - 1
Dec.	376.5	18.3	264.7	19.4 - 1
Jan.	347.8	33.6	266.6	18.1 - 1
Feb.	318.8	14.4	279.6	17.1 - 1
March	324.3	23.3	299.5	15.7 - 1
Apr.	p. 294.4	p. 15.8	p. 309.7	p. 15.0 - 1

Association. The machine tool industry is thus reaping the fruits of its expansion and increased production programs. As shipments increase over new orders, the ratio of unfilled orders to the production capacity will drop.

News from here and there

Nation's independent iron ore producers met in Washington and discussed with Defense Materials Procurement Agency exploration and development of iron ore properties in the Lake Superior district. The operations will require very large capital expenditures. DMPA agreed to consider the problem. . . . Sufficient quantities of iron and steel scrap are available to warrant slackening allocation operations; however, NPA warned to beware of another scrap shortage next winter. Considerable scrap will be needed. . . . Removal of inventory controls on the pig iron industry was urged to NPA. Supply situation has improved to the point where controls are no longer needed, according to the industry. The industry is opposed to the export of pig iron until domestic consumers have ample inventory. . . . Cold Finished Carbon and Alloy Industry told by NPA officials the ammunition program is greatly in arrears, and the present production of bars was only sufficient to meet actual battlefield needs. It was stressed the whole trend in modern warfare is "more materiel and less men." . . . Maximum elimination of controls over production and distribution of steel products was urged to NPA by the steel products industry. They suggested a trial test during the fourth quarter. . . . New instructions to reduce by one-third the paper work involved in preparing alloy melt schedules are under consideration by NPA. Backlog of orders for alloy steel forgings has increased about 200,000 tons in the past two months and now amounts to 720,000 tons. Production of alloy steel forgings will have to be increased about 25%. Manganese will be in short supply if further shut downs occur in the steel industry, because most manganese is made in blast furnaces.

Ratio Unfilled

Reprints of Special Boring Reports Available

Reprints of the eighteenth and nineteenth special machine tool reports are now available at no charge. Besides a review of late model boring machines and specifications of boring machines manufactured in this country, are articles on: Methods of establishing location of holes and flat surfaces, automatic power positioning, precision boring. Write MACHINE and TOOL BLUE BOOK, 222 E. Willow Ave., Wheaton, Ill., for your copy.



Putnam adds more so you can remove more—easier. Extra operations are added to normal practice in grinding end teeth, so you can be certain of non-clogging, free cutting. The special relief thus produced by Putnam eliminates chiptrapping pockets, tends to force chips out.

For the best in end mill performance, specify Putnam—made by end mill specialists.





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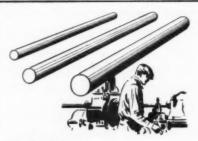


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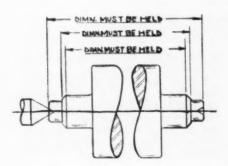
JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK + BOSTON + PHILADELPHIA - CINCINNATI - CLEVELAND - DETROIT
PITSBURGH - BUFFALO - CHICAGO - MILWAUKEE - ST. LOUIS - LOS ANGELES - SAN FRANCISCO - SPOKANE - SEATILE

A dual-purpose lathe fixture

A CYLINDER, resembling a rolling pin, had to be turned at both ends to very accurate dimensions—with a minimum of motions. Accompanying this order was a piece part blue print similar to the one shown in figure 1. The production machine on which the part was to be turned was a heavy duty lathe.

After investigating many and varied aspects of this problem, the following situations had to be overcome:

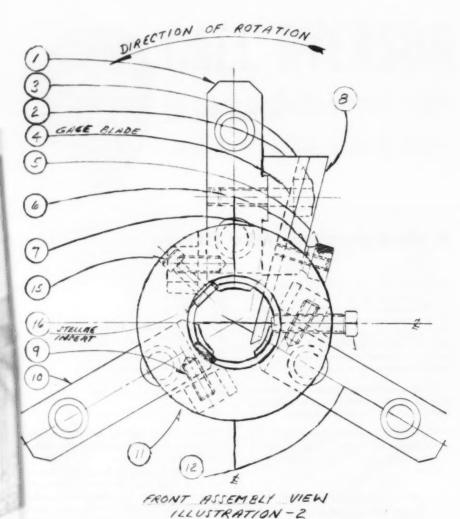
 We had to control the overall dimensions by some gaging device around the chuck jaws and headstock area.





by Paul Prikos
Weiland Tool & Mfg. Co.
Chicago, Ill.

- Concentricity had to be maintained between the two smaller diameter shaft ends.
- 3. The cylinder had to be turned down on one end first (between centers). A driver dog at the other end made possible the rotation of the piece part while the tool bit removed the excess metal to the required dimensions.
- 4. After the part was finished machined at one end, the other end could not be finished in the same manner because the lathe dog would mar the finished surface of the newly turned end. Improvising with soft metals or shims between the screw end and the part was ruled out.



5. Lastly—motion economy—the time t saver, dictated that a self contained, i

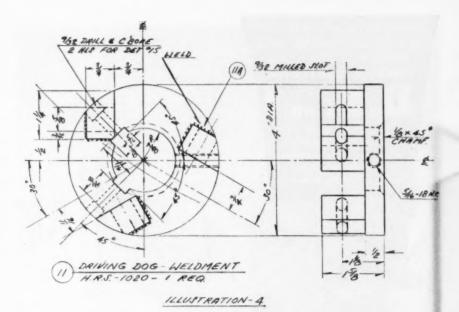
non-removable lathe fixture had to

be designed.

Because all details and views of the original design drawing are obviated due to space, nevertheless, three partial views of the drawing should be ample to convey an understandable solution

to the problem. These views are shown in illustrations that follow.

A three jaw chuck with the center remaining in the head stock became the foundation upon which the tool construction was based, see figures 1 and 2. The first shows a front view looking into the lathe headstock. Three ordinary sets of jaws were used with



one having a step on one side. An angular sliding gage block was mounted in such a manner so that it could slide horizontally along the step for dimensional adjustment (for example, when the center is reground it becomes shorter and comparable gage adjustments have to be made). Going into further detail, a location blade was inserted having a sliding fit so it could move up and down along a 15 degree angle and out of interference range. by simply loosening the knurled nut and moving it upward. The nut is then tightened again, thereby holding the blade firmly in the new position.

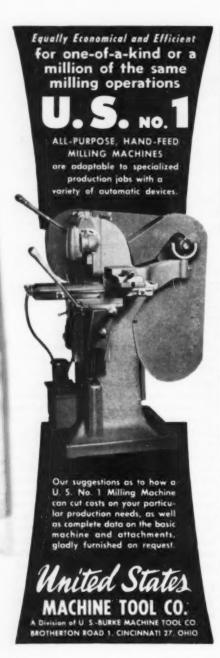
Here one should observe that the gage setting block was mounted on the side of the jaw permitting the machine operator to perform this function from the top side of the jaw rather than fumble underneath it.

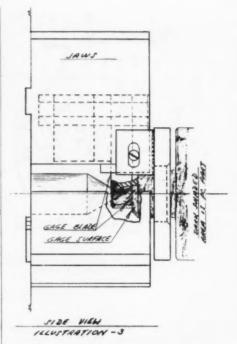
The driving dog of weldment construction, had three elongated holes milled in the rectangular-like projec-

tions. These holes restricted the movement of the dog through the set screws which were fastened securely in the jaws, figure 4. These set screws are of utmost importance since they anchor the round dog in a loose enough fashion permitting the operator to expand the jaws sufficiently out of the way to accept the rough o.d. shank part of the cylinder. Later, the jaws mounted on the chuck had to be bored smooth on the i.d. to grip the finished turned shank, thereby preventing surface marking. From this explanation we can see that the dog was used in conjunction with the center to hold firm one rough shank end while the other end was being finished turned. The latter being done at the tailstock end.

To further explain the underlying function of this tool a sequential analysis of the tool in operation may be of additional help:

1. Load—the machine operator must have the jaws in the open position,





with the gaging blade in the up position. This would mean that the blade is outside the bore size of the dog. Figure 2 shows the blade in the down and gaging position—contrary to the loading position. Continuing, the piece part is placed in the lathe between centers and tightened with the dog. This is a three point bearing; namely, the screw pushing the cylinder shank against two hardened insert plates.

- 2. Turn down the shank end near the tailstock to finished size.
- 3. After the above operation, the other end must be machined. Loosen the dog by turning the screw and retract the tailstock center. Turn the piece part around, drop the gaging blade by loosening the knurled screw and tighten in the down position. Bring the jaws down tight on the newly



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Queen City Machine Tool Co. 235 East Secend St., Cincinnati 2, Ohio finished turned surface and in unison advance the tailstock center to hold the other end. At this moment the round dog will rest freely on the set screws away from the piece part and will turn around independently. The gaging blade has now insured proper positioning with relation to the toolbit, thereby producing correct overall dimensions after the remaining end is properly machined.

4. Upon conclusion of this latter turning operation, the operator opens the jaws and slides back the gaging blade making the machine receptive for the next part, thus completing a full cycle of operation.

I believe the tool described in this article can have many adaptations. It is suggested to those who may decide to modify the idea, that a suspension spring arrangement be devised to prevent jarring noises normally prevalent when a lathe dog is revolving and stopping at different moments of operation. However, in our case the arrangement described worked satisfactorily and fulfilled its ultimate purpose of motion economy.



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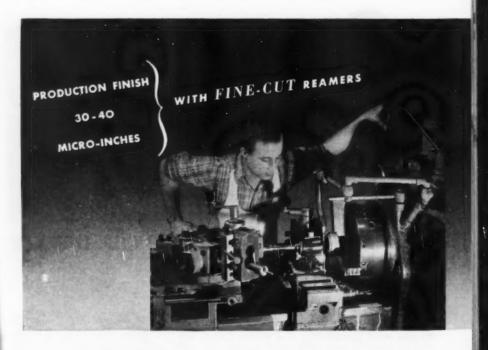






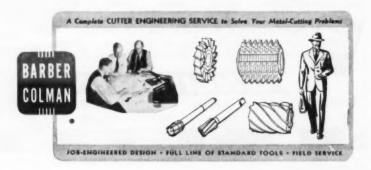






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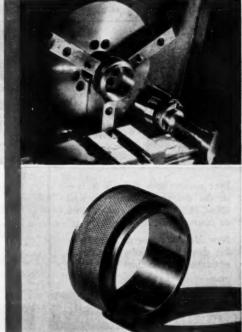
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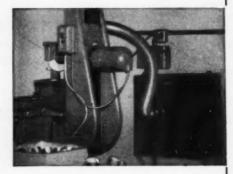
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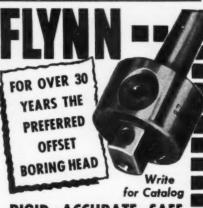


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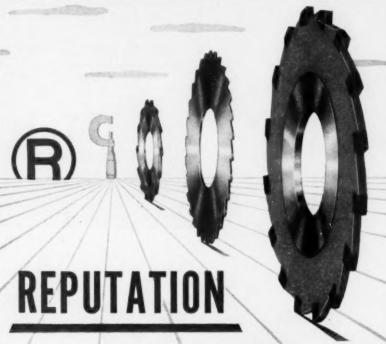


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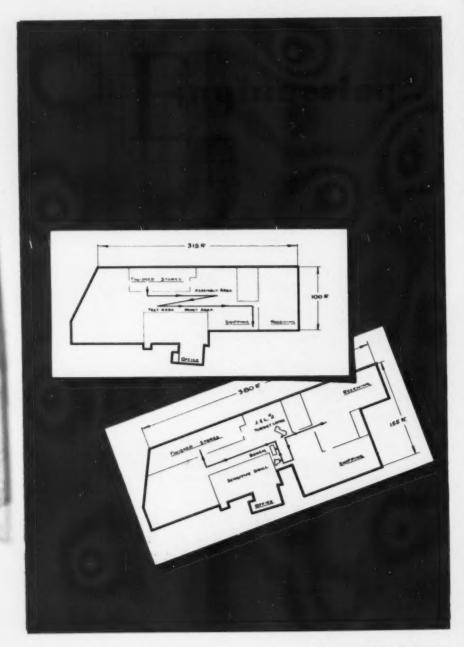
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IS NATIONWIDE NATIONAL SERVICE

dens



can cut costs and increase production for smaller plants

by Frank William Miller, vice president,

Yarnall-Waring Co., Philadelphia, Pa.

SMALL PLANTS grow only if integrity and knowledge are applied intelligently; however, with growth and time come many new engineering responsibilities. One of these is revitalizing original ideas to meet new, more modern, and more difficult requirements. Too frequently there is a reluctance to invest in engineering to solve the new tasks. At other times these new tasks are not recognized and obsolescence sets in, resulting in failure of the business.

The new enginering tasks for small plants are old ones for the large plants, and these tasks had to be successfully resolved before the plants could grow. These engineering tasks, for small plants, are like a bunch of keys—each key opening the door to a new experience, and often to a new field of endeavor.

The majority of small plants require engineering work in various forms and degrees. This work may be done through either the full-time employment of engineers, part-time employment of them, or a combination of the two. There are other lines of engineering which are needed and which are becoming most helpful, such as:

- The engineering done by machine manufacturers, process apparatus builders, instrument firms; and
- 2. the quite diverse engineering done by equipment manufacturers who con-

tribute cranes, hoists, conveyors of many types, fire extinguishing apparatus, lighting fixtures, etc.; and

3. the important engineering done by architects and construction firms which provide small plant designs, special floors, walls, cooling and heating installations designed especially for the small establishment.

What, then, are some of the keys which will help increase production and help reduce costs for the small plant? By small plant we are not limiting our discussion to the ten or twentymen shops, but are including even those which may employ several hundred workers and which may, relatively speaking, be considered as small plants.

In this discussion I should like to point out some definite examples of savings which, with planning and thinking, can be duplicated by other plants. I have broken down the various engineering tasks into: (1) Machine tools; (2) transportation engineering; (3) tool engineering; (4) methods engineering; (5) material engineering; (6) engineering specifications; (7) research tasks.

Eliminate obsolete machine tools

The first key is that one which opens the way to "Modern Machine Tools." The machine tool which is most nearly automatic in performing the required operations consistent with quantity of parts involved and difficulty of machining operation is the most economical to use. The machine tool requiring the least expenditure of human energy is to be carefully selected by an experienced engineer and recommended. Human energy costs about 150 cents per hour whereas electrical energy in like quantity costs 0.1 or less cents per hour-a ratio of 1500 to 1. Or, as Dean Potter of Purdue University writes: "Human slavery is not only illegal, but uneconomical." The intelligent and increasing uses of modern machine tools are required to pay present-day wages and security benefits while maintaining high standards of living for all

Mr. William J. Kelly, president of the Machinery and Allied Products Institute, has stated: "American industry is replete with mechanical cadavers, economically dead but not yet buried. This condition, I am convinced, is due to a significant weakness in current managerial practices; re-equipment policy is not scientific but is the product of industrial folklore handed down from one generation of managers to the next." Re-equipment is peculiarly pertinent as an engineering task confronting small plants in the future and needs the study of engineers trained in this field. Paying for the new machine tools by not having them is an extravagance no one can afford.

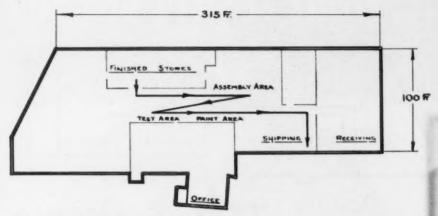
The machine tool builders have done much for the small plant, but much more is to be done by them. More flexible machines for short runs and simpler, less costly machines are needed.

Transportation engineering

There is a reluctance to correct items seemingly as small as additional floor space and adequate internal transportation; however, with sufficient floor area the machine tools can be placed according to the most economical plan. This plan is the key to the door marked "Handling Eliminated." An engineer acquainted with the flow of materials marks the flow of material lines on this plan. Machines can be placed strategically to avoid wasted steps in getting material to and from a machine to provide for the shortest distance to the finished stores, inspection department, tool room, shipping department, etc.

A reduction of 35% of the handling cost was made possible by providing modern facilities such as electric hoists, motorized trucks, hydraulic lifts, accessible bins of sufficient size and area for placing rough and finished work at machines. With such facilities pro-

1. Tabulation of		istance of valve parts
Part	Previous (in feet)	Present (in feet)
	Lot of	50 pieces
Angle Body	1210	940
Yoke	400	390
Head	350	110
Tube	2240	980
Stem	605	445
Gland	635	155
Ring	635	125
Screws	415	480
Wheel	535	170
Stud	385	385
Seat	405	425
Assembly	5975	400
	13790	5005
SAVINGS-8785		-



2. B.O. Valve Gland before expansion. Travel: 635 feet.

vided, these savings can be realized.

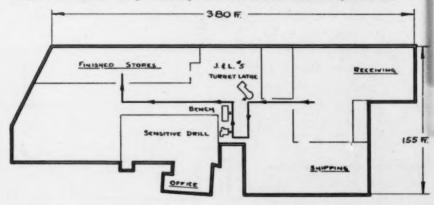
An addition of 28% manufacturing and stores floor area in 1948 provided for rearrangement of machine tools and relocation of some departments. The savings in travel distance of some valve parts resulting from these changes are shown in figure 1. This is the distance traveled by the material from the time it was received in rough stores through the machining operations, then to finished stores.

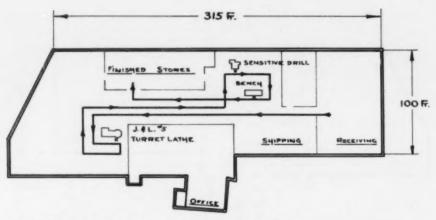
Figure 2 gives travel distance and flow line of valve gland before rearrangement while figure 3 shows the saving of 480 feet, or 75%, in travel distance of this same part due to the rearrangement.

Figure 4 gives flow line for valve parts from finished stores, to assembly, to testing, to painting, and to shipping—a distance of 275 feet before rearrangement.

Figure 5 shows these same parts

3. B.O. Valve Gland after planned expansion. Travel: 155 feet; savings: 480 feet.





4. B.O. Valve Assembly before expansion. Travel: 275 feet.

traveling 145 feet to the same departments, or a saving of 130 feet (47%) credited to rearrangement.

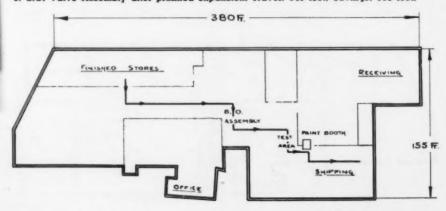
The return on investments made to secure these savings is a reward for engaging engineers to solve these tasks.

The cost of handling material in this plant (a machine shop) was about 10% of the shipping dollar. This is a very large part of that important dollar and more than most of us realize. Unavailable material resulting from crowding

causes the material handler to move the material as much as three times. Lack of trucks, tote pans, dollies, bins and skids resulted in paying for man hours not gainfully employed.

These few facts should show that transportation and layout are important engineering tasks to be studied by engineers and then remedied. The improvement may be a simple rearrangement of facilities or, when growth in past and future are to be provided

5. B.O. Valve Assembly after planned expansion. Travel: 145 feet; savings: 130 feet.

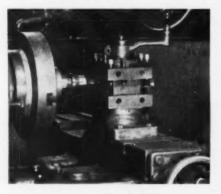


For the FINEST Tools... Specifu





6, 7, and 8 show the old method of machining a head piece for seatless valve plunger. Photograph above shows the head piece being turned and drilled.

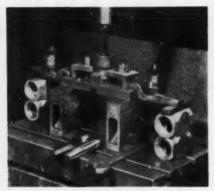


8. Another turnet lathe operation, turning to fit the plunger tube.

for, it may be necessary to go to the extent of an addition of floor space. The savings will justify the investment.

Tool engineering

Carbide cutting tools are still taboo in many small plants. But they can be used successfully on almost all work, including interrupted cuts. As an example, a carbide cutting tool may replace grinding in finishing valve seats and discs having Stellite facings. A trained operator with technical ability



7. Acme thread tapping the head piece on an upright drill.

is required to properly prepare these tools and demonstrate the most effective use of them, but, when properly prepared, such tools effect savings not only in tool material but in machining the part, and this more than offsets the higher cost of the higher skilled man.

Tipping tools with carbide and grinding tools in a department having suitable grinders for such work can save 50% or more of cutting tool costs.

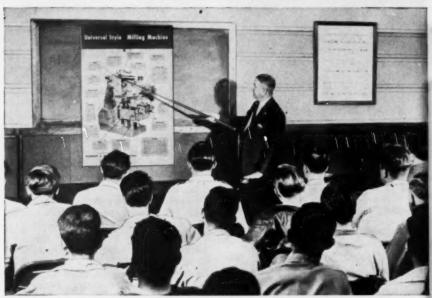
Specifying correct drills for special work, such as drilling Stellite, can be the means of solving difficult operations.

In our plant drilling and finishing small radiused entrance holes less than 1/32" in diameter in stainless steel were costly in time lost and broken drills until an engineer was assigned to study it. The study resulted in a cost reduction of 35%. Since these finished stainless steel parts are made in lots of 5000, savings are appreciable and continuous.

Methods engineering

A good shop methods engineer can be the engineering key to real savings by judiciously creating easier working conditions and faster operating cycles. Any machine tool operator, given the proper machine tool of the latest type

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9 and 10 show the new drilling and tapping fixture and combination turning tool machining the head piece for seatless valve plunger as shown in 6, 7, and 8. In the photo above a drilling and tapping fixture has been provided.

10. By using this combination turning tool and the drilling and tapping fixture of photo 9, the heads are being produced at the rate of 13.7 per hour, or an increase of 93%.



and having his machine equipped with correct cutting tools, is still in need of jigs and fixtures and a practical norm for feeds and speeds.

Feeds and speeds, as well as the material being machined, determine the life of tools and the effective cutting rate, and to a large extent the conditions of the finished piece. The heavy modern machine tools with large motors and with properly prepared tools can produce quality work in much less time than previously required.

Some examples in machining and assembly operations help to demonstrate the change in methods effecting appreciable savings.

Figure 6 shows a head piece for seatless valve plunger being turned and drilled.

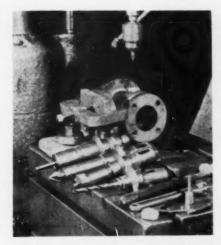
Acme thread tapping on an upright drill, figure 7, is followed by further turret lathe turning to fit the plunger tube, figure 8. Production of heads in this manner was at the rate of 7.1 per hour.

By providing a drilling and tapping fixture, figure 9, and a combination turning tool, figure 10, these heads are now produced at the rate of 13.7 per hour, obtaining equal or better quality of work. This is an increase of 93%.

1½" steel valve body was drilled and tapped for gland stop screw on upright drill, figure 11. Production rate of 12 bodies per hour was obtained.

A well-designed drill jig, figure 12, when used on same upright drill increases production to 23 bodies per hour (or 91% increase) with a marked improvement in quality of the work done.

The packing channel of Gun-Pakt expansion joint gland is shown in position for drilling under a small upright drill, figure 13. By using the old layout method, the overlapping twin holes required for elongated opening, including drifting out of metal between holes, could be completed at the rate



of 0.77 glands per hour (for 10" size expansion joint).

Figure 14 shows a new indexing and drilling fixture together with the knock-out unit to produce the same elongated opening. The rate of finishing was increased to 1.49 per hour, or 93%.

A ½" cast iron strainer assembly was made by holding the body in an ordinary vise and inserting internal parts which was followed by tighten A 1½° steel valve body is drilled and tapped for gland stop screw on an upright drill.

ing the screen bushing with box wrench as shown in figure 15. This was done at rate of 25 assemblies per hour.

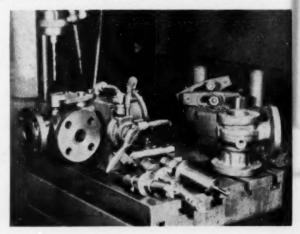
The rearrangement of parts for convenience in subassembly and final assembly is shown in figure 16. Also shown is an air-operated vise controlled by foot valve to hold the bodies while subassemblies are put in place and tightened with air-operated wrench. These investments in equipment and placing of parts for convenience increased the assembly rate to 139 per hour, or 450%.

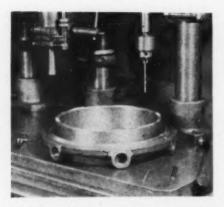
These examples serve to show the savings made possible by an engineer alert to the possibilities of changing and improving jigs, fixtures, and assembly conditions in a small plant. A new product, when first put into production, may not justify an appreciable investment in jigs, fixtures, or other special equipment, but the time does come and it is then that the small plant must use methods engineering.

Material engineering

Each manufacturer purchases ma-

12. A well-designed drill jig, when used on the same upright drill increased production 91% over the method used in figure 11. In addition to the increased production a marked improvement in the quality of the work was noted.





13. The packing channel of an expansion joint gland is shown in position for drilling under a small upright drill. By using the old layout method, the overlapping twin holes required for elongated openings, including drifting out of metal between holes, could be completed at the rate of .77 glands per hour (for 10" size expansion joint).

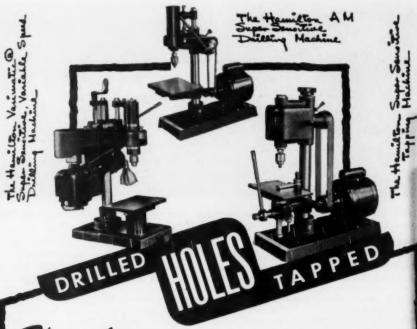
14. The new indexing and drilling fixture, together with the knock-out unit, producing the same elongated opening. The rate of finishing was increased to 1.49 per hour, or an increase of 93%.



terials and parts. As each company's engineers develop new, improved products, it becomes essential for them to select materials best for the product, best for the producer in terms of costs and production time, and best for the product user. It is company suicide to avoid this because the advances are often so great that a competitor can, by using them promptly, secure a distinct advantage. To evaluate the extent to which the new or improved products can be used is a continuing task of the engineers, and we are constantly doing material engineering in our plant. One of the materials we use is Nitralloy, which has been accepted as a good plunger material for the YARWAY Seatless Valves. It lengthens the life of these seating surfaces and makes the valve control of fluids at relatively high temperatures and pressures economically possible.

Ductile titanium is one of the newest engineering materials. It has desirable characteristics such as great corrosion resistance. The cost is high at present, but the cost of aluminum was high at one time. And you will recall that a small plant, a really very small plant, pointed the way to the more economical production method of electrolytic reduction of aluminum from the ore.

The host of new materials presented to the manufacturer are bewildering in their number and field of usefulness. Selecting the right material is "operation engineering" and competitively a necessity. It is fortunate that we have so many materials. This is one of America's greatest assets and avoids depleting a strategic material without having a substitute. In fact, the lay opinion has developed in this matter to such an extent that, when some natural resource is in danger of depletion, it is fully expected that the engineers and scientists will provide a better one.



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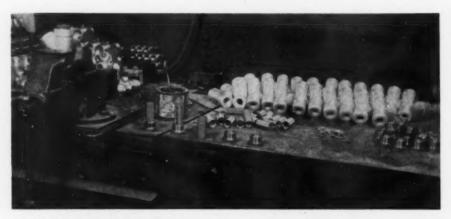
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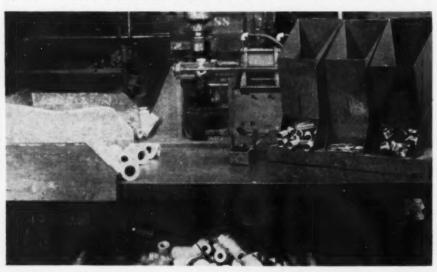
15. A $\frac{1}{2}$ " cast iron strainer assembly operation using an ordinary vise, inserting internal parts, and tightening the screen bushing with a box wrench.

Engineering specifications

Back of the engineering specifications there is a designer who has carefully prepared the symmetry of design, ma-

terials to be used, and exactly how each step in preparation of finished part or process is done. In his hands lies a large part of the cost of the completed

16. The rearrangement of parts for convenience in subassembly and final assembly. The air-operated vise, which holds the bodies while subassemblies are put in place, is operated by a foot valve. Also shown is an air-operated vise controlled by a foot valve to hold the bodies while subassemblies are put in place and tightened with an air-operated wrench. Production was increased 450%.



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Capacity -

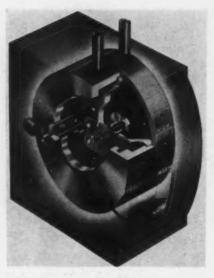
takes stock to 11/2" dia., or where work permits, round stock to 2" dia. (to 2%", with outside feed) and hex stock to 134" across flats.

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17. The Yarway Liquid Level Indicator was created from an idea discussed during a regular engineering conference.

product. In some plants this varies from 25% to 35%. Yet in almost all small plants there is a lack of the fundamentals of cost studies of the product's component parts and the finished assembly. Usually a good guess suffices for the answer to the materials specified and the shop methods required for production.

This haphazard control of such a large part of product cost can be corrected by engaging a trained engineer with a desire to consult cost and production departments in meeting a predetermined competitive price. This can be done without sacrificing the quality or appearance of the product or usefulness of a process.

Research tasks

The small plant can have as effective a research group, proportionately, as a large one, for the results of a research group depend on the ability of the men rather than on the number

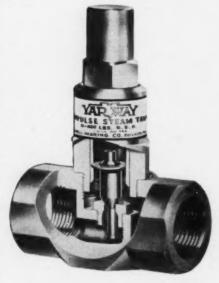
of men. Their task is breathing new life into the products of the small company to keep it competitive.

The YARWAY Liquid Level Indicator was created from an idea discussed during a regular engineering conference. However, the conversation soon became enthusiastic as the possibilities of the idea were unfolded with sketches used to indicate its practicality. The year that followed was replete with models on trial for performance and for appearance until the accepted unit was evolved. A sectioned model is shown in figure 17.

Engineering solutions of such tasks insure the plant's future if they satisfy a demand, and the task is not complete until this demand is met.

Commercial laboratories, college laboratories, and consultants are avail-

18. The Yarway Impulse Steam Trap is an example of the way in which college personnel and a college laboratory were used in aiding the development of a new product.





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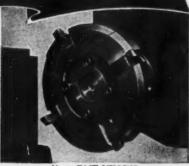
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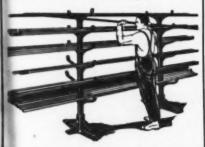
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The creation of the YARWAY Impulse Steam Trap is a good example of the way in which college personnel and a college laboratory were used in aiding the development of a new product. This is shown in figure 18. The operating principle is novel and unique and is based on the characteristics of fluid flow through two orifices in series.

Summation

Although I have mentioned quite a few lines of engineering which should be more definitely developed in and for small plants, I have been able only to touch on this subject.

Keen management discernment must be matched by keen engineering insight, and these in turn must be matched with increasing worth inherent in machinery and equipment. The resulting costs and prices must be made always lower rather than always higher, no matter what the difficulties may be to achieve this. But if this apparently impossible objective is achieved, small plant engineering is bound to take an upturn as never before.

This material is taken from a paper delivered by Mr. Miller before the Annual Meeting of the ASME, New York, 1950, and is reproduced with permission.

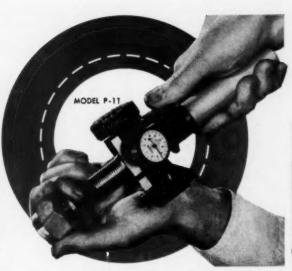
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. . . report on cold forming and general machinability

by James Joseph

MACHINISTS and tool designers at North American Aviation, Los Angeles, make no bones about what they expect from titanium within the next ten years. They expect big things, Among them, titanium's replacement of stainless steel on airplanes. A conventional airplane's frame contains about six per cent stainless steel, a jet engine fighter, more than 18 per cent. Despite titanium's present-day cost of \$25 a pound, airframe machinists and tool design men say, "Don't let that fool you." Meaning, that as with aluminum, titanium can be expected to drop about \$2.00 a pound each year, as demand increases. There is another indication of titanium's increasing use: aircraft companies don't mind the big cost bite so long as they can be assured at least 25 per cent weight reduction. Weight means everything in aviation, and with titanium as strong as stainless steel, and about 40% lighter, the swing is on to titanium.

This will mean, within the next ten years, that hundreds of machine shops will have to work titanium—as subcontractors to aviation and other titanium—using industries.

Right now, mostly aircraft machinists are faced with handling titanium, but they predict, on the basis of practical machining experiments, geared to future production-line technique, that titanium will mean a lot of reschooling for machinists and tool designers. And

here's why: Titanium has two objectionable characteristics: (1) It work hardens easily; (2) it warps, takes on springback characteristics that make sheet metal forming a tough job.

The first application of RC-130-A titanium sheet stock (a '7% manganese titanium based alloy) to production dies has been going on at North American. Although these applications (bending, forming, stamping, drilling, sawing and die drawing operations) are admittedly experimental, they have been set-up to show the comparison between machining alloyed titanium and ½ hard stainless steel.

Some seven important conclusions have grown out of this actual, although experimental, machine shop practice: (1) Work hardening seems to be the foremost problem; (2) proper draw radius may improve results: (3) the use of proper lubricants should reduce pressures and contribute to easier forming; (4) controlled temperature dies and heated material may prove the only sure forming method; (5) preparation of stock, blanking and shearing in relation to grain direction may be necessary; (6) 3½T bend radius may be the absolute minimum for alloyed titanium. at least for cold working; (7) Hot work tool steel inserts or beryllium copper applied to the die draw surfaces may be the best materials for die inserts (draw radius).

Let's look at a typical machine shop test at North American, illustrating that cold forming is not now practical with titanium:

Test No. A

(Forming was done in a PPFD designed to incorporate stretch and shrink characteristics. The die was designed to provide and maintain die temperatures up to 1000 degrees F. Draw radius inserts were fabricated of tool steel, the draw radius, .187". Punch corner radius was .187" or 1½ T. The die was operated in an hydraulic type press which used Clorofin-type lubricant, applied to both die and material. Test No. A (one of many) involved ½ hard stainless steel; Test No. B, alloyed titanium, RC 130A).

Stock: ½ hard stainless steel Size: .062 x full flat pattern Punch radius: .187 R or 3 T

Operating temperature: Cold die, cold material

Draw radius: .093 R

Form: Full form, complete with joggles

Result: Good—no fractures Test No. B

Stock: Alloyed titanium Stze: .062 x full flat pattern

Punch radius: 3 T

Operating temperature: Cold die, cold material

Draw radius: .093 R

Form: Punch entered die 1/4 inch

Result: Complete Fracture in 1/2 area (corners)

These illustrate North American's 8 conclusions to date. Titanium was worked on a DoAll band saw, standard drill press and punch press, break dies, and punch press form die.

In power sawing titanium bar stock, North American's Frank J. Pesak, development engineer, found the going extremely difficult. The trouble is that work hardening sets in, often knocks the set from saw blades, and causes the blade to seize in the work. Band saw cutting doesn't seem practical at present. The reason: tool breakdowns make it slow speed, thus inadequate for pro-



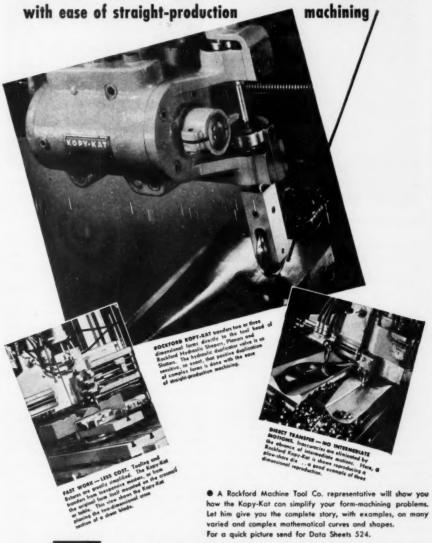
Tensile strength test of a titanium specimen is set up.

Precious item — titanium. Sally Stephens points at enough of the stuff to buy three Cadillacs—about \$15,000 worth.



186

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Dianium specimen being given creep test.

duction work. Abrasive cutting is too expensive. No real machine-shop solution has yet been worked out for sawing titanium, either alloyed or commerclally pure (99% titanium).

Press form dies

Most apparent success for right angle bending proved to be about a minimum 4T for cold working, but the pressure required is much greater than for ½ hard stainless. Titanium stock, moreover, has creep tendencies, making it difficult to bend in exact areas. But heating both work and tools can relieve this problem, says Pesak, who also recommends annealing after each successive bend. For RC-130-A he suggests 1-2 hours of annealing at 1100 degrees F. Same holds true for RC-130-B (bar stock).

Drilling: (When drilling into alloyed titanium the going was comparatively easy even on material that was previously heated to temperatures up to



So that oxidation won't take place, titanium parts are silver-brazed in the helium atmosphere of a bell jar by means of a heating coil. This work is being done at North American Aviation's Downey plant.

1500 degrees F. and cooled.) Proper and better lubricants should provide success here. In all cases of drilling and milling, the problem centers around work hardening. Machinists at North American are now working out speed and feed ratios, have accepted the formula: less speed, more feed. This is necessary so that tools are continually biting into "virgin" stock—keeping ahead of work hardened portions.

One of the problems of working (especially dimpling), sheet stock (both commercially pure and alloyed) titanium is its tendency to warp and springback. This can be licked by heating the metal, usually to 450-600 degrees F, and forming on a hot die, about 300 degrees F.

Here are some of the problems which tool designers and machinists are trying to overcome at North American, where the aircraft industry's first production tests using both commercially pure and alloyed titanium, are going on. Ed. Note: In the United States Air Force Machinability Report, Volume 2, is an interesting section on the machining of titanium. We are here reproducing this section for our readers in the hope that it might round out their understanding of titanium's machinability.

The Machinability Reports are sponsored by the Resources Planning Section of the Industrial Planning Division of the Air Material Command at Wright-Patterson Air Force Base in Dayton. The machinability program is being carried out under the guidance of Curtiss-Wright Corporation who are also the publishers of the report. Readers desiring further information regarding these splendid and helpful reports are referred to the Curtiss-Wright Corp., Wood-Ridge, New Jersey.

Titanium machines like jet-engine alloys Turning

High speed steel tools having the following angles: 0° back rake, 15° side rake, 0° side cutting edge angle, 5° end cutting edge angle, 5° relief afford nine cubic inches tool life at 40 f.p.m. cutting speed at .009" feed and .062" depth of cut. A water soluble cutting fluid was used. Carbide tools provide 10 cu. in. tool life at 200 f.p.m. cutting speed. Early laboratory tests indicate that feed should be about .012". Cast iron grades of carbide appear to give the best results.

One of the important processing operations on titanium is the lathe cleanup of billets prior to all forging and rolling operations. The surface condition of these billets is poor because of casting pits, slag inclusions, hard particles, and contaminated alloy. These surface defects must be removed before billets are processed to avoid distributing the contamination throughout the finished product and to prevent damage to forging and rolling tools.

Some improvement to the surface can be effected by sand or shot blasting, and by etching as much as .008 to .012 in. if necessary. Some of the worst defects are removed by scarfing or snagging.

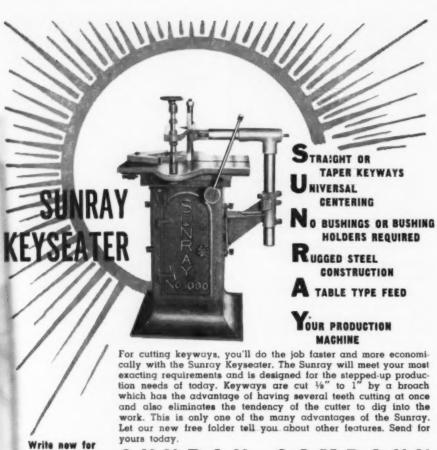
Milling

Comparative test findings on milling, drilling, and all others, immediately introduce an array of additional variables. Factors such as cutter diameter, number of teeth or flutes and helix angle, to mention a few, make the analysis more difficult. Comparative information may be misleading, therefore, unless tests are conducted under identical conditions.

The presently available data on milling and drilling are all of a preliminary trial nature to uncover the best course to follow in more detailed test work. A few isolated findings are given. In general, it can be said that titanium alloys can be machined fairly satisfactorily at speeds in the vicinity of 70 f. p. m.

One company's experiments in milling as of January 1951 are interesting. They have found 18-4-2 high-speed steels about the best of the steel tool materials and cast-alloy cobalt-chromium tools superior to carbides. One trouble in carbide milling is that carbide sections tend to flake off due to combined effects of intermittent cutting and the "welding" of chips to toolface. Axial-flow compressor blades are being made from Ti-150A as a possible substitute for AISI 410 Stainless steel. Data on this operation follow.

With Tantung side and end mills operating at about 90 f.p.m. (4-in. diameter, 75 r.p.m.), tool life is about 150 pieces per cutter grind. With Vasco Supreme (18-4-1) high-speed steel end mills, the ends of 1¼ x 1½-in. bars are milled square to length at about 50 f.p.m. (2¼ in. cutter diameter, 92 r.p.m.) with a 1/8-in. depth of cut and 1 in. per minute table feed. Tool life



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SUNRAY COMPANY P. O. BOX 445 SPARTANBURG, S.C.

is about 120 pieces between grinds (about 25 cubic inches metal removal).

Cut-off operations

Reports on Sawing titanium vary from "difficult" to "almost impossible." Band sawing seems to be out; the Motch and Merryweather saw seems to work with fair success; and certain types of hacksaws give promise. Abrasive sawing is the best bet at the moment, however, provided proper equipment is used. In abrasive sawing titanium, it is impossible to plunge straight through a large piece. The wheel must cut successive overlapping shallow scallops, keeping the area of wheel contact as small as possible at all times and giving the coolant the maximum access. If possible, the work should be slowly rotated or indexed so the wheel can cut toward the center and never have to cut more than halfway through. Machines having a wheelhead capable of oscillating as



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well as plunging motion are ideal. Titanium's poor heat conductivity requires the maximum flow of coolant if heat cracking it to be avoided. The tendency to clog wheels also accentuates the importance of minimizing the wheel-work contact area.

A soluble-oil type coolant is available that kills the objectionable rubber-wheel odor. Seven-inch diameter titanium bars have been cut, rotating the work and oscillating the wheel, in ten minutes (about 14.2 seconds per square

inch). A one-inch bar is cut in four seconds.

Considerable promise is shown in the abrasive cutting of titanium at lower wheel speeds. Three to four thousand f.p.m. wheel speeds (instead of the usual five to six thousand) have been tried with good results; at these speeds wheel wear is reduced appreciably.

With hacksawing, constructive recommendations indicate an extremely coarse saw (two to four teeth per inch), slow speeds and heavy feeds. Ordinary



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fine-toothed saws and conventional feeds result in extremely small feedsper-tooth. With titanium, this results in rapid work hardening which makes further cutting extremely difficult.

Drilling and tapping

All machining operations on titanium alloys require the observance of this rule: because of the rapid and extreme work-hardening tendency, do not disengage feed while tool is in moving contact with work. This is particularly true in drilling. For the same reason, pilot holes are "out" and the enlarging of holes is to be avoided. Poor thermal conductivity and a strong "pick up" or "welding" tendency are two more properties of titanium which require special techniques, and the tough, non-curling type of chip further complicates



larger work and the solid type for smaller work, Motch & Merryweather Triple-Chip Saw Blades give the same proven advantages: speed and accurate lengths and square, burrless ends with minimum scrap and long life and last low cost. 8" to 84" diameter . . . The top advantage: Triple-Chip turns cuts into dollars.

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the picture in drilling and tapping because of the space restrictions.

Eccentric drilling, using high-cobalt drills with notched lips, and slow speeds and about double the feed common with steels offers promise of giving improved results. (Next smaller size drill, point ground off center, runs out, drilling a larger hole.) This minimizes rubbing and reduces pick-up and heating.

The notched lip idea in drilling when

carried over to tapping results in use of staggered-tooth taps, which also tend to break up chips. Use of a 60% thread and a tapping speed of 12-15 f.p.m. are also recommended.

Lockheed tests titanium alloys

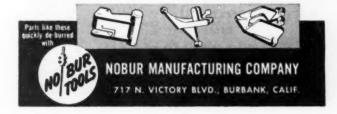
Extensive preliminary tests on the 5% chromium, 3% aluminum alloy have been made. Selected data on the development of turning and milling techniques are included here.

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Turning tests were run with carbides of several makes, cast-alloy materials and high-speed steel. Of the carbidetool tests, the information on Kennametal is the most complete but its inclusion is not intended to imply any exclusive preference.

Styles AR 10, BR 10 and D 10, and modified versions of these tools were used, all having the following tool angles: 0° back rake, 6° side rake, 0°

side cutting edge angle, 6° end cutting edge angle, 6° relief. Lockheed's toollife technique is to cut a predetermined quantity of metal (measured in square inches of machined surface) with each tool under identical conditions, then study the wearland or extent of breakdown. The four initial tests were made using a feed of .010 i.p.r. a depth of cut of .030 in., and 35 f.p.m. cutting speed. Oil was used as a cutting fluid and 55



square inches of surface were machined. (This is equivalent to 5.5 cu. in. at .100 in. depth of cut.)

K3H, a steel-cutting grade, K6, a hard, cast-iron grade, K2S, a cast-steel grade, and KM, a general-purpose grade were tried. (See manufacturer's catalog for more exact description.) Both the K6 and K2S tools performed successfully, exhibiting practically no wear for the 55 sq. in. cut. K3H showed medium tool wear, considered as ex-

cessive; the KM tool wore about the same.

On the strength of these findings, K6 was again tried, this time at .020 i.p.r. feed, .060 in. depth of cut and 100 f.p.m. cutting speed. The tool was permitted to cut 95 sq. in. of surface in which time the tool had cratered badly. (With double the feed and almost three times the speed of the previous test, the machining rate here was six times that of the earlier run in terms



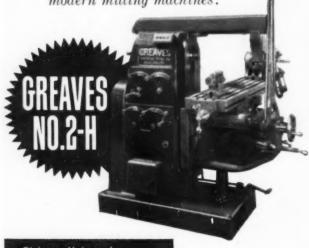
of square inches, and twelve times in terms of cubic inches, as the depth of cut was also doubled. The number of square inches machined increased from 55 to 95; therefore, the cutting time for the second test was approximately onethird that of the first test.)

A finishing cut was then made, again using K6 carbide. Feed was set back at .010 i.p.r., and depth of cut was made very shallow, only .0025 in. Speed, however, was increased slightly to 120 f.p.m.,

and 140 sq. in. of surface were machined. Wear was very slight and results were considered satisfactory. Finish in all tests but the heavy feed run was good: about 100 micro-inches.

Milling

Milling tests were performed on a Kearney & Trecker No. 2 horizontal milling machine, using both carbide and high-speed steel cutters. Cutting speeds from 20 to 720 f.p.m. and feeds your best buy in modern milling machines:



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from .004 to .016 in. per tooth were tried:

With a 4-in. diameter, 4-tooth KM carbide-tipped endmill having 6° negative axial rake and approximately 6° positive radial rake and a 6½° clearance angle, tests were run under various conditions. At 21 f.p.m., cuts were taken at .006 and .008 in. feed per tooth using lard oil. In both cases the tool dulled rather quickly. A later test was run with the same cutter on titanium, using

no cutting fluid, at 46 f.p.m. and .008 in. feed per tooth. In this case, the tool cut well for a short time, followed by extreme heating and rapid breakdown.

High-speed steel side-milling cutters, plain and chromium plated were also tried, at speeds from 27 to 31 f.p.m. and feeds of .004-.005 in. per tooth with poor results. The chromium-plated tool broke down very quickly while the plain cutter having a slightly lower radial rake and less axial rake lasted



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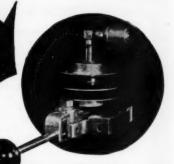
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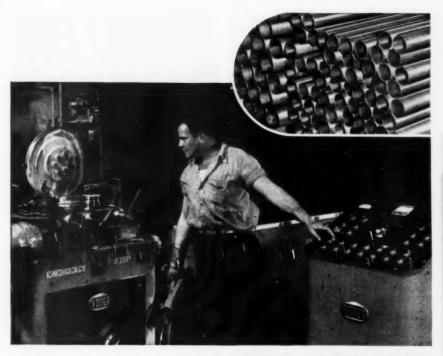


for 2 sq. in. before losing its edge. Tests were then performed with a 6 in, diameter, 6-tooth Carboloy-tipped side milling cutter having 21/2° negative radial rake and 6° negative axial rake. The titanium test piece was submerged in a bath of dry ice and tri-ethyl-phosphate resulting in a temperature of 100 F. With this setup, speeds from 31 to 69 f.p.m. at feeds of .005 to .008 in. per tooth produced no tool wear. At 30 f.p.m. and .016 in. per tooth, wear was slight. At 89 f.p.m. and .013 in. per tooth wear was also slight. (In both cases, the finish was coarse.) Tests were also run at 118, 151 and 195 f.p.m. and feeds of .0045, .0015, and .008 in. per tooth, respectively, and the results were progressively poorer. A test was made at 720 f.p.m. in which the tool was badly damaged. Cutting time in these tests was not stated.

The End.



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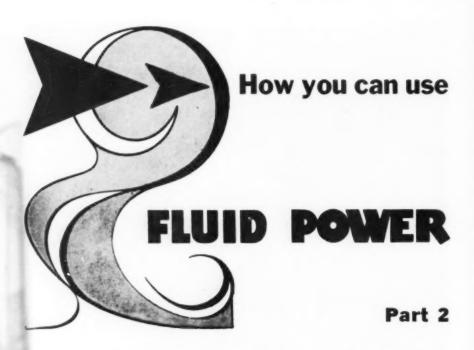
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Safety and production through fluid power

by H. L. Stewart, Logansport Machine Company, Logansport, Ind.

PRODUCTION and safety, or safe production, is the keynote of American industries today. In almost any plant one enters one will see large posters stressing safety and accident prevention. Management realizes that in order to have better working relations with their employees they must provide better equipment and safer equipment for them. The days are pretty well gone when one sees an operator with two or three fingers missing because he happened to have his hand in a press at the wrong moment. Improved devices eliminate the great majority of this trouble.

The machine shown in this article is a good example of what can be designed to further safe production. This machine is not only a safe machine from the operator's point of view but it is safe in design theory. This spinning and staking machine, made for one of the large automotive accessory manufacturing plants, is used for the assembly of tie rod ends. Its design allows for dual operation on one machine. The first operation is a staking operation and the second is a spinning operation. The operator is in complete control of the machine at all times. By merely flicking a valve handle, the machine immediately comes to a complete stop. Since the operator loads the assemblies on the turntage at the front of the machine, there is no chance for



A dual purpose machine. This spinning and staking machine is used for the assembly of tie rods. The first is the staking operation while the second is the spinning operation.

her to get her hands under the staking or spinning heads. The assembly station is easily accessible at all times and loaded during the automatic dwell period. The operator has her hands free at all times for assembling, loading and unloading. After she shifts the starting lever, the cycle will continue automatically if she so desires. If she shifts another valve it will go thru one cycle and stop. The features which make this machine safe from a design point of view is the fact that before the turntable can index, the staking and spinning cylinders must be completely re-

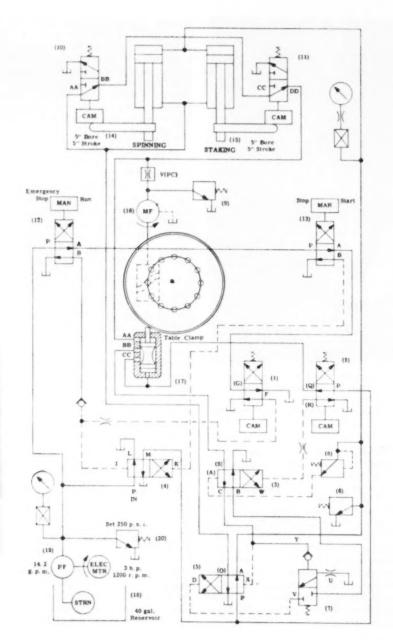
tracted. This is brought about by an interlock in which the cam on each cylinder must depress a valve stem before any oil can flow to the hydraulic motor which operates the turntable. This eliminates the possibility of the staking cylinder retracting and tripping the control valve, allowing the table to index before the spinning cylinder is out of the way.

Another safety feature is that of the hydraulic motor in relation to the index table. If the table for any reason jams or binds the hydraulic motor will stall, eliminating any chance of breakage. The power on the motor is governed by the pressure setting of the relief valve which is just enough to turn the cam mechanism for operating the table under normal conditions.

On this twin cylinder machine a maximum force of 4900 lbs. can be exerted on the staking tool and 3700 lbs. on the spinning tool. The pressure adjustment is easily controlled by a relief valve which allows for a wide range of pressures depending on the toughness of the material. After the machine is once set up to operate at a certain pressure, it will repeat accurately until another pressure range is desired. The amount of pressure required is not left up to the operator as on a manually operated machine.

By merely adjusting a valve, the dwell at the bottom of the spinning stroke can be adjusted from 0 to 10 seconds. Doing this mechanically would be quite a problem but hydraulically it is very simple. This machine will go thru 480 cycles per minute if the spinning cylinder does not dwell at the end of the stroke.

On some high production machines using fluid power for motivating means, double control valves are employed to keep the operator's hands out of the way of the ram or tool. If the operator



The hydraulic circuit

Machine circuit using hydraulic index and interlock

Operator shifts handle of valve No. 12 to "run" position and latches handle of valve No. 13 in "start" position if she wishes continuous cycling of machine. If she only wants the machine to go through one cycle and then stop, she only momentarily shifts handle of valve No. 13 to "start" position, then releases it. This directs pump supply to "out" port B to pilot chamber K of valve No. 14. Piston of valve No. 4 moves to left, directing pump supply to "out" port M to "in" port P of valve No. 5. Valve piston No. 5 being in position shown, pressure is now directed to top of ram cylinders for down stroke at pressure governed by setting of relief valve No. 6. Pressure is also directed to "in" port P of valve No. 2 and to "out" port Q to port CC of valve No. 17, holding lock plunger in place and out BB of valve No. 17 into port S of valve No. 3 and out port C to ports X and Y of valves No. 5 and No. 7. Both rams advance and at end of down stroke, pressure build-up in line opens valve No. 8, directing pilot pressure to port A of valve No. 3. Piston of valve No. 3 moves to right, exhausting X and Y of valves No. 5 and No. 7, and directs pressure from port S to port B to port U of valve No. 7. After adjustable dwell period of valve No. 7 expires, port U is opened to port V and pilot pressure is applied to port D of valve No. 5, shifting piston to right. Pump supply is now directed through port O of valve No. 5 to lower side of ram cylinders and to port AA of valve No. 10. Both rams return and at end of up stroke, valves No. 10 and No. 11 are depressed to position shown. Pressure at port AA of valve No. 10 is now directed to BB to "in" port CC of valve No. 11 and "out" port DD to fluid motor No. 16 and to port AA of valve No. 17. Lock plunger is withdrawn and fluid motor now rotates index cam and cam shaft, carrying operating cams for valves No. 1 and No. 2. The table indexes and release of piston in valve No. 2 connects pressure port P to "out" port R to pilot chamber W of valve No. 3, shifting piston of valve No. 3 to left to position shown. Port S of valve No. 3, however, has no pressure as it is supplied from port BB of value No. 17 which is blocked when lock plunger is retracted. Cam momentarily closes and overrides valve No. 1, applying pilot pressure to port G from port F to pilot chamber J, shifting valve piston No. 4, completing cycle and by-passing pump back to tank through port M of valve No. 4.

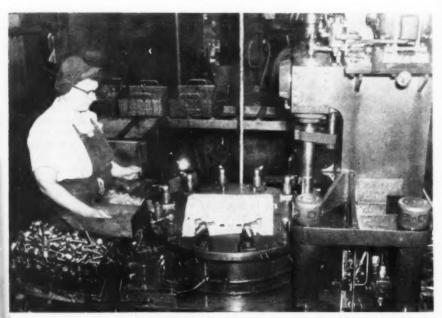
removes either hand from the controls during the power stroke the machine will automatically stop. Still other machines are designed which are completely enclosed except for one door and this door must be closed before the machine can be operated. There have been many other ways devised to safeguard the operator as much as possible depending upon the type of fluid power device involved.

With production as a must and experienced operators at a premium, it is likely that even more emphasis will be placed on safe production both for the operator and for the machine itself.

MAINTENANCE AND SERVICE TIPS

Noisy Pumps

Noisy pumps in a power unit may be much more serious than the noise alone. Noise may be caused by:



Another view of the staking and spinning machine. A detailed circuit chart, outlining the salient control and operating features, will be found in the accompanying diagram. The operator is in complete control of the machine at all times. By merely flicking a valve handle, the machine comes to a complete stop.

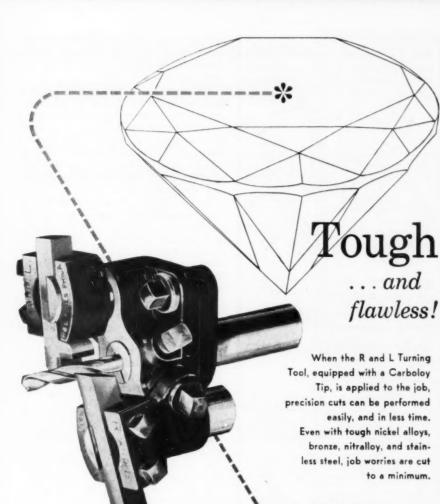
1. A leak in the intake line. If there is a tiny leak at any of the joints between the pump intake and the oil level of the unit air will be pulled into the pump, causing cavitation. By taking an oil can and squirting a little oil at each joint the leak can easily be found. It's extremely important that all joints in the intake line be thoroughly checked when original assembly is made.

2. A leak around the seal on the pump shaft. This is usually caused by wear either from dirt and abrasives collecting around the pump shaft or from long service. Leakage at this point can easily be determined by the above method. New seals and often a new

shaft are required to remedy this situa-

3. Clogged intake strainer or a strainer of insufficient size. This will starve the pump and cause cavitation. Clogged intake strainers are usually caused by a dirty system or from the use of a poor oil which breaks down. On one occasion it was found that a black thick sludge formed in the bottom of the unit and filled up the suction screen. The suction of the pump completely collapsed the strainer, The sludge entered the pump and ruined it along with the relief valve.

On another occasion, it was found that the customer only put a small wire mesh over the end of his suction line



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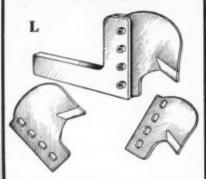


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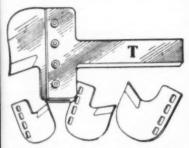
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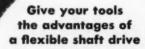
MESSENGER TOOL CO. 629 N. RESERVOIR ST. POMONA, CALIFORNIA instead of a suitable strainer and the starving of the pump set up a terrific noise. No loss occurred as the trouble was discovered in time.

- 4. Return line too close to suction strainer. If the return line to the power unit is too close to the suction strainer, bubbles occur which allows air to enter the strainer and pump. This can be overcome by putting the intake strainer at one end of the reservoir and the return line at the other end; between the two should be a couple of baffles.
- 5. Insufficient oil in unit. If the oil level should drop too close to the strainer, air again will enter strainer and get into the pump. This sometimes occurs in installations where the cylinders are located a long distance from the unit. A larger reservoir is usually the answer.
- 6. Pump running too fast. All manufacturers of hydraulic pumps recommend a maximum speed or range of speeds for their pumps. This recommendation should be closely followed if satisfactory results are to be expected. Check r.p.m. of electric motor if drive is direct. If drive is indirect, check pulley and gear ratios.
- 7. Pump out of line with motor. If the motor shaft and hydraulic pump shaft are not in line noise may occur in the coupling or in the pump which can cause considerable trouble in a short time.
- 8. Oil viscosity too high. If oil viscosity is too high it will be a source of noise which can easily be overcome by changing to a thinner oil. Check for pump manufacturer's recommendations.
- 9. Air vent plugged. If the air vent is plugged oil will not flow properly and the pump will be starved, causing cavitation. Make sure that air vent is free.

End of part 2. Part 3 will appear in the August issue of MACHINE and TOOL BLUE BOOK.

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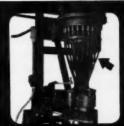
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A special report by the editors of MACHINE and TOOL BLUE BOOK

Report number 2

Drilling machines.. part 2

This is the twenty-first in a monthly series of special reports discussing various types of machine tools. Included in this month's special report on drilling machines are:

- 1. Drilling plastics, aluminum, magnesium.
- 2. Descriptions of late model drilling machines.
- 3. Specifications of American-built machines.

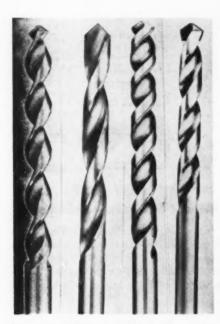
Previously published reports discussed: 1. Thread Rolling; 2. Power Press Brakes; 3, 4, 5. Milling machines; 6. Honing, Lapping, and Superfinishing; 7. Automatic Screw machines; 8. MAPI Replacement Formula; 9, 10. Chucking machines, Turret Lathes, Hand Screw machines; 11. Broaching machines; 12. Shapers, Slotters, Keyseaters; 13, 14, 15. Lathes; 16. Planers, 17. Geor making machines; 18, 19. Boring machines; 20. Drilling machines, part 1.

Drilling plastics, aluminum, magnesium

DRILLING PLASTICS is basically different from metals. They are not crystalline in nature and respond differently. In general it is best to keep drills sharp by lapping or honing cutting edges. Clearances are practically always greater than for metals. Use highest speed possible without overheating. When gumming cannot be eliminated, use coolants. Lubricants carry away heat and improve finish, plus aiding in chip removal. One of the best is a thin. mild soap solution. For shallow holes soap from a bar may be rubbed directly on the drill. If oil is used an extra cleaning operation is necessary.

Resins and phenolics are usually drilled without a liquid coolant. A jet of air helps though. Celluloses, polystyrenes and acrylics are drilled with water or soap solutions. If the material contains a large amount of abrasive filler the speed must be materially reduced. Also the latter three must be drilled at slower speeds than some of the others because of a tendency to heat and become gummmy.

For drilling of small diameter holes a special drill, called a bakelite drill, substantially as shown in figure E, has been developed; one with wide flutes, polished, to aid in the ejection of chips.



Left to right, figures A.B.C.D.

Figure A, This type plastic drill was designed especially for laminated plastics. They may also be found useful on some types of molded plastics. Note the wide polished flute, permitting rapid penetration without clogging.

Figure B. Such types are designed expressly for use on molded plastics or other materials where similar chip formations are encountered. Figure C, Solid Carbide drills are not designed to cut ferrous materials where chips are strong and tough. This type is used on abrasive plastics, aluminum, brass, bronze, copper and other similar materials. Figure D, Carbide tipped drills such as this are good for abrasive plastics, etc. Where carbide drills are required in sizes smaller than No. 31 most manufacturers recommend solid tungsten carbide.

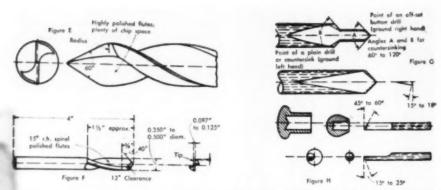
The included point angle is 60°, instead of 118°, with the corners rounded. Clearance at the periphery is 12° to 15°.

For larger holes a larger included angle point can be used, 90° to 120°. On a larger drill, the heel behind the cutting edge should be ground away, leaving a land about 1/16" wide, reducing friction and clearing chips. If drills have a tendency to pull when breaking through, it is advisable to slightly flatten the front of the cutting edge, similarly to drilling in soft brass.

For blind holes, a fast spiral drill is sometimes used as it pulls the chips away from the cutting edges quickly, but for holes that are drilled completely through, a slow spiral, as shown, is better. The web should be thinned as much as possible, thereby reducing the friction and heat at the center of the drill point.

Some plastics, for instance the hot set type-phenols and ureas, dull drills quickly. Special drill designs, recommended by manufacturers are often helpful. Also, for cold set molded parts like cellulose acetate and polystyrene, the heating tendency should be minimized, clearing the drill repeatedly. Polished or chrome plated drills are preferable here. For thermosetting plastics, (heathardening), drills having 60° to 90° included angle points and highly polished flutes are helpful. Many prefer carbide tips with the web ground to .015" at the point and increased to .060" within \". For acetates, standard drills and feeds are sometimes used but the ones with a long tapered point are preferable.

In some plastics, drills cut oversize, depending on rigidity, condition of drill, etc. Trial and error is all that can determine procedure here, other than generalities. In drilling phenolics, drills are sometimes about .003 undersize. For small holes, an off-set button drill or a plain drill or countersink is often used,



Upper left, figure E; lower left, figure F; upper right, figure G; lower right, figure H.

For drilling in thermosetting plastics (heat hardening), drills shown in figure $\bf E$ are preferred. These have a 60° to 90° included angle points and highly polished flutes. Carbide-tipped drills, shown in figure $\bf F$, are preferred by many; in these the web is ground to .015" at the point and increased to .060" within $\frac{1}{2}$ ". For drilling small holes some use a drill like that shown in figure $\bf G$, while for drilling deep holes a half-round drill, shown in figure $\bf H$ is often employed.

while in drilling deep holes, a halfround drill has proven satisfactory.

In hard rubber carbide tips are recommended.

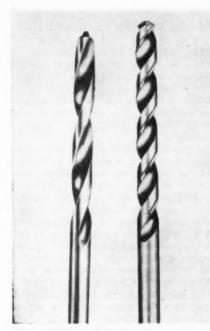
Because of the great amount of plasties and different reactions from drilling, some hesitate to set down too rigid rules for cutting speeds. However, most of these materials can be drilled at speeds ranging from 100 to 300 s.f.m., depending upon depth of hole and material characteristics. For cellulose acetates, drill speeds approximate these figures: for 1/16" drills, about 7300 r.p.m.; for 1/8" about 3600 r.p.m.; for 1/4", 1800; for 3/4", 1200; for 1/2" 900 and for 34", 600 r.p.m. These speeds compare with laminated plastics in the approximate proportion of-4" drill for laminated, 2500 r.p.m. to 1800 for cellulose acetate plastics, same size drill.

Hollow end mills, mounted in a vertical drill press, can be used in thin stock. In laminated compounds, or heavy sheeting, fly-cutters are useful for holes over an inch in diameter.

Fixtures for drilling plastic are simple. Guide bushings should be used. Plates made beneath jigs are useful, to prevent breaking out. Because of the damaging effect of abrasives on points, diamond-tipped drills are being used extensively. For the so-called tough laminated materials, standard drills with the lips backed off to provide plenty of clearance, or carbide drills are used. In the latter case, speeds up to 15,000 r.p.m. have proven successful.

For drilling parallel to lamination, use a flat or bottom drill. Sizes should be about .002 larger than specified. Similarly, an oversize tap should be used, due to springback.

In reaming plastics a very slow speed and a fast feed are necessary. Tapping is possible, but molded threads are superior to machined ones.



Left to right, figures I, J.

Figure I. Double-fluted twist drill, standard 24° spiral angle; figure J. special double-fluted twist drill, 47° spiral angle. The increased spiral angle of the latter gives more hook to the cutting edges and causes the drill to cut more freely; especially helpful in drilling deep holes in aluminum.

Drilling aluminum

Sometimes ordinary twist drills give considerable trouble drilling aluminum and its alloys. Like all other tools for machining aluminum, drills should have a keen edge and much cutting fluid used with them. In some instances the single fluted twist drills used in hard wood have proven satisfactory yet a better drill for aluminum is one in which the flutes have a greater spiral angle, or more twists per inch. The increased spiral gives more hook to the

cutting edges and causes the drill to cut more freely. It is also helpful in removing cuttings in deep drilling operations.

Twist drills similar to the standard drill but made with large, deeply cut flutes, with a polished finish, produce excellent results in drilling all aluminum alloys. These are used in deep drilling and in the larger ones are provided with holes through the length of the drill to permit forcing cutting compound to the tip of the drill.

Speeds for drilling aluminum may range from 400 to 500 peripheral feet per minute for carbon steel drills, and 600 f.p.m. for high speed steel drills, to as high as 2,000 f.p.m. for carbide tips.

The standard twist drill having a 28° spiral angle, is suitable for holes of medium depth up to about six drill diameters, while the slower action spiral is better for thin stock, having less tendency to "hog in." The point of angle is 116 or 118° as supplied on twist drills, should be increased up to about 130 to 140° for most aluminum. However, for high-silicon alloys, drills should have about a 90° point for ease of penetration, A standard lip clearance of 12 to 13° should be increased up to about 17° for heavy feeds and for use on the softer alloys. Insufficient lip clearance leads to drill breakage.

While thin sections do not need lubrication, it is essential for deep hole drilling. Soluble oil emulsions or kerosene and lard oil mixtures are generally satisfactory. It is desirable to supply the lubricant to the drill and work under forced feed. In deep drilling, the work should be kept cool by spraying and the drill should be withdrawn several times during drilling to be sure that the lubricant floods the hole completely. If drills break frequently, the trouble may be caused by lack of rigidity in the machine or work, an ex-

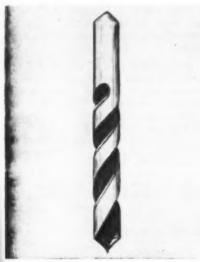


Figure N.

Figure N. This is a sort of combination drill developed from the good points of several other drill types, for use in magnesium. Note the spiral change from about 40° at the shank to about 10° at the tip. Also, notice the tip to aid in guiding the drill for straight holes.

cessive feed or insufficient lip clear-

Drilling magnesium

For ordinary depth of holes, in drilling magnesium, drills of the regular type, but with polished flutes, will operate satisfactorily. Lip clear ance should be 10° to 12°. For deep holes drills with wide, polished flutes should be used. However, three types of drills will effectively service all drilling operations: drills for sheet metal, shallow holes (depth less than five times the drill diameter), and deep holes. Standard steel drills, though satisfactory, cannot do as well, for maximum production, as can those that have been modified.

A standard 118° point angle drill can be used to drill magnesium sheet, but for maximum production and absence of burr, a slightly modified drill is indicated. Reduce point angle to approximately 60° to prevent "walking" of drill, to reduce thrust and to prevent abrupt change of thrust when breaking through. Keep chisel edge within range of 120° to 135°. A helix angle of approximately 10° will prevent work from climbing the drill on the break through.

Only few modifications are necessary to secure maximum production in shallow hole drilling. Standard helix angles of 25° is satisfactory, but may vary from 10° to 30°. Highly polished flutes facilitate flow of chips out of the hole, especially if low helix angles are used. Standard point angles of 118° and chisel edge angles of 120° to 135°, giving a relief angle of approximately 12° will give best cutting action. Point angles may be reduced to as low as 70° and spur joints can be added to eliminate any spiralling in the drilled hole. It is extremely important that the cutting edges be kept sharp.

Deep hole drilling in magnesium produces a quantity of chips which must be guided out of the hole through a considerable length of drill flute. Highhelix drills (40° to 45°) will do this satisfactorily. Flutes should be opened and polished to provide larger chip spaces and smooth surfaces to aid in chip removal. Low helix angle drills or those with unopened flutes may cause chips to jam, resulting in high torques and poor surface finish.

Chisel edge angles of 135° to 150° are essential to provide a good surface finish and minimize spiralling in the hole. Angles larger or smaller than those recommended cause difficulties due to improper relief at the cutting edge and lack of proper centering of the drill. A standard drill point of 118° is all right. A spur or pilot point ground at the center of the drill will reduce spiralling or "run-off." Use this spur

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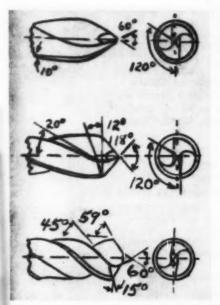
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point drill for all deep hole drilling to insure straight, smooth holes. Of particular importance in the use of multiple spindle or automatic drilling machines is the fact that this type of drill can be used to drill holes up to 25 times the drill diameter without withdrawing the drill to clear the flutes.

A mineral base cutting oil will reduce torque and facilitate the drilling of extremely deep holes.

Drill jig bushings should clear the work by a minimum of 1½ times the drill diameter to reduce the effective depth of holes. Avoid chipping or niching of drills in the bushing.

Top to bottom, figures K. L. M.

Figure K, Reduce point angle to approximately 50° to prevent "walking" of drill, when working in sheet magnesium, to reduce thrust and to prevent abrupt change of thrust when breaking through. Figure L. In shallow hole drilling the helix angle may vary from 10° to 30°. Highly polished flutes facilitate flow of chips out of the hole. Standard point angles of 118° and chisel edge angles of 120° to 135°, giving a relief angle of approximately 12° will give best cutting action. Figure M. Drilling deep holes in magnesium calls for high-helix drills (40° to 45°) with opened and polished flutes to give big chip spaces and smooth surface for easy removal.

Speeds up to 2000 feet per minute can be used on magnesium. Feeds should be heavier than those used for other metals in order to secure proper chip formation. Small drills work best with light feeds; heavier feeds should be used on large drills to prevent jamming of the chips. Wide deviations from recommended feeds are allowable when drilling shallow holes, but recommendations for deep hole drilling should be closely followed for best results. See Table 1.

References

"Engineering Bulletins." National Twist Drill and Tool Co.

The Cleveland Twist Drill Co. The Ace Drill Corporation.

Reynolds Metals Co.
Aluminum Company of America.

"Industrial Notes," Bureau of Ships, Navy Dept.

Table 1 SPEEDS AND FEEDS FOR DRILLING MAGNESIUM

DRILL DIA. in.	SPEED f.p.m.	SHEET	SHALLOW HOLES FEED—Lp.r.	DEEP HOLES
1/4	300	0.005 to 0.030	0.004 to 0.030	0.004 to 0.008
1/2	to	0.010 to 0.030	0.015 to 0.040	0.012 to 0.020
1	2000	0.010 to 0.030	0.020 to 0.050	0.015 to 0.030

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Descriptions of late model drilling machines

South Bend's 14" bench

drill press

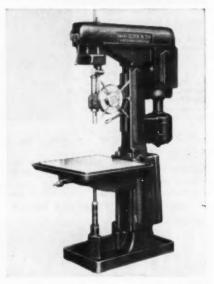
The free-floating spindle design prevents misalignment, side thrust, and whip. Two precision ball bearings carry the drive sleeve and two additional ball bearings carry the spindle, which is spline driven. All ball bearings, being



pre-lubricated and sealed, require no oiling. Quill bearing adjustment provides feather-touch tension and secure locking. Base has bolt holes for securing to bench, and precision-ground work surface with two slides for clamping.

Fosdick's high speed sensitive drill

These machines, made by the Fosdick Machine Tool Co., Cincinnati, Ohio, are obtainable with 6, 9, 12 or 18 speeds. A single-speed or a two-speed motor is placed directly underneath the top bracket, bolted in a vertical position on the top column, and connected to the gear box by means of a flexible coupling. An individual, motor-driven pumpis used to supply cutting compound. Machine is equipped with power downfeed which operates through a positive clutch. Advantage of this type of clutch is its powerful drive without slippage, coupled with ease of disengagement at any point under any stress of heavy



drilling. Reversing motor for tapping is operated through a magnetic switch.

Foote-Burt vertical fixed center

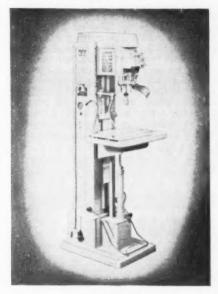
This type of machine, made by the Foote-Burt Co., Cleveland, Ohio, has



a wide variety of applications for drilling, boring, reaming and tapping. Overhang of the spindles is constant regardless of the position of the head on the ways, consequently much higher cutting speeds and feeds can be used in multiple drilling. Heads are designed with spindles set at fixed centers. Spindles on drilling machines are geared for proper speed and tapping machine spindles are geared to give proper lead to each tap. Three sizes of these machines have mechanical feed; two sizes have hydraulic feed.

Snow air-controlled drilling machines

Threading, drilling and tapping are accomplished with fluid pressure, controlled electrically, so that quick acting automatic clamping fixtures, dials, magazines, hoppers are made fully



automatic, semi-automatic or manually-operated all by the turn of a switch. These machines, made by Snow Mfg. Co., Bellwood, Ill., have built in full universal controls that allow selection of the type of spindle cycle desired. Sensitivity of power application prevents tool breakage.

Leland-Gifford 2-LMS

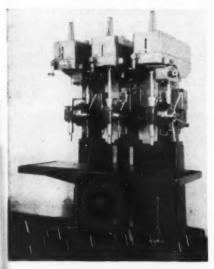
The indicating shift of this 2-LMS, made by Leland-Gifford Co., Worcester, Mass., selects correct spindle speeds for different drills in a variety of materials. An easy turn of the handwheel changes spindle speeds and shifts back gears without stopping the machine. The machine is sensitive enough to



drill 1/16" holes in steel, yet has power to take heavy cuts. Two methods of tapping are available, a No. 2 spindle nose friction tapper may be furnished, or a reversing motor tapper. Two types of hydraulic feed are available, the step-by-step for deep hole drilling, or a plain feed for shorter holes or reaming.

Western 2-12 upright drills

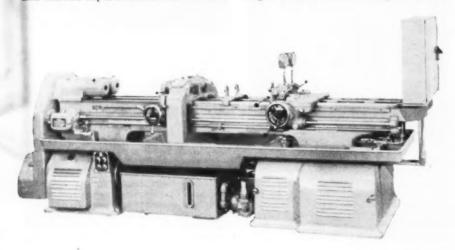
On these machines, made by Western Machine Tool Works, Holland, Mich., a power down feed can be supplied which incorporates a worm wheel drive from the spindle, and automatic feed release for any selected depth up to 4½", and can be instantly disengaged for manual operation. The entire mech-



anism runs in oil. It is so arranged that the operator can advance the tools rapidly to the work, where upon meeting the work piece with a slight further pull on the capstan, the power feed is instantly engaged. At the required depth, which is indicated on a large, legible dial, a slight upward push on the capstan releases the power feed and enables rapid retraction of the tool from the spindle, an automatic feed locking power feed in neutral for hand feed operations. Machines can be supplied with one, two or three heads, all self-contained.

Pratt & Whitney deep hole driller

The deep hole driller made by Pratt & Whitney, Div. Niles-Bement-Pond Co., West Hartford, Conn., is designed for handling a wide range of work including rifle barrels, automotive connecting rods, hollow spindles, wrist pins, boring bars, printing press rolls, stay-bolts, crank and camshafts, etc. Producing long true holes is very different from ordinary drilling. The single flute deep hole drill remains stationary while the work revolves around it. This special type of drill has a hole throughout its length which carries high pressure oil to its tip. The oil blows the chips away from the cutting edge and out through an external flute along the drill. The work spindles are driven either by separate motors mounted in the headstock cabinet leg, or by a varidrive unit at the rear of the machine. High pressure motor driven oil pumping units are built into the cabinet leg at the right. The machine is so arranged that the twin drilling units can



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be operated independently. The drill carriage has an adjustable automatic safety knock-off which will stop the machine when overloads are encountered from dull drills or hard spots.

Defiance production drilling machines

These machines, made by Defiance Div., The Ohio Machine Tool Co., Kenton, Ohio, are readily converted from single spindle machines to special multiple spindle machines without extra attachments. Construction permits

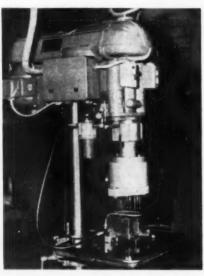


changing height of column. Drill head units can be mounted in gangs on a special base for multiple operations. The machines can be arranged for hand feed tapping operations by providing a reversing motor and reversing type starter. Central automatic lubrication system for entire drive and feed mecha-

nism. Guided quill provides same support to nose of spindle throughout entire spindle travel.

Beckett-Harcum drilling machines

These single spindle drilling and tapping machines, made by Beckett-Harcum Co., Inc., Wilmington, O., are made in bench and floor types. Each type is available in three models: for drilling only, for drilling and tapping using a standard reversing motor, for drilling and tapping using a special high reversal motor. The bench machines are compact and easily moved



and may be positioned very close together on production lines or close by other machinery for second operation work. The floor-type units are high production units. Equipped with a production-type table, operations can be performed either with the operator standing or seated. Available in 15" or 20" sizes.

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Specifications of American-built machines

estern Machine	Tool Works		Holl	and, Michigan
Type and Model	Drilling Capacity C.I.=Cast Iron S=Steel	Range C=Center of Spindle to Column Face S=Spindle Nose to Table	Table T=Vert. Table Travel WT=Work Surface of Table S=Spindle Travel	of Feeds
Upright Drills No. 2-12 single	C.I.=1" S=% (.20 carbon)	C=12" S=30'4" No. 2 Morse 29'4" No. 3 Morse	T=18 ¹ ½"; WT=22"x24"; S=8"	S=infinitely variable; 400-2200, 190-2200 120-1300, 50-600 F=9; .005" to .18" HP=1%
No. 2-12R Round Pedestal	do	C=12" S=29¼" No. 2 M. 28½" No. 3 M.	T=22" WT=20%" dia. S=8"	do
No. 2-12D Duplex (2 Spindle)	do	C=12" S=284" No. 2 M. 274" No. 3 M. Center to Center of Spindle=234"	T=22"; WT=22"x48" S=8"	do
No. 2-12T Triplex (3 Spindle)	do	do Center to Center of Spindle=19"	T=17"; WT=22"x62" S=8"	do

	D=Drilling Cap.,	S=Swing Over		1
Type and Model	Dia. DL=Drilling Cap., Length	Bed, Dia. DS=Dist. Between Spindles	Speeds	Feeds
Deep Hole Driller %Bx30"	D=3/10".5/8"; DL=30"	S=8": DS=8"	Any speed from 500 to 3500, depending on requirements	Any four to meet requirements, from .0002" to .0018"
½Bx50″	D=3/16"-5/8"; DL=50"	do	do	do
18x50"	D=%"-1"; DL=50"	S=9": DS=10½"	do	Any four, from .0002" to .0036"
1Bx74"	D=%"-1"; DL=74"	do	do	do
1 1/2 x 37"	D=1"-2"; DL=37"	S=10"	Any speed from 115-854, depending on requirements	Any four, from .0005" to .011"
11/2×61"	D=1"·2"; DL=61"	do	do	do
1 1/2 x 81"	D=1"-2"; DL=81"	do	do	do
1%x105"	D=1"-2"; DL=105"	do	do	do
1%x129"	D=1"-2"; DL=129"	do	do	do
Model C 6-Spindles	D=3/16"-5/8"; DL=4" to 14"	S=5%"; DS=10"	Speeds to suit requirements, 900-3600	Feeds to suit requirements,

eckett-Harcum	Co., Inc.		W	ilmington, Ohio	
Model and Size	D=Drills or Taps to Center C=Chuck to Base CT=Chuck to Table S=Strokes	T=Work Surface of Table B=Size of Base	Speeds and Feeds and Horse Power	Remarks	
Drilling and Tapping W 15 EH Beach	D=15": C=17½" CT=12": S=3½" max.	T=10"x12½" B=10"x9"	1/2 h.p. 1740 r.p.m. for drilling	For drilling only. Also available with production table: CT=18½"; T=14½"x16"	
W 15 ETHS Bench	do	do	½ h.p. 1740 r.p.m. ½ h.p. 1140 r.p.m.	For drilling and tapping. Also available with production table. Same as above.	
W 15 ETHL Bench	do	do	% h.p. 1740 r.p.m. 1 h.p. 1140 r.p.m. for tapping	15" cap. using high reversal motor. Also available with production table. Same as above.	
W 20 ETHS Bench	D=26"; C=17%"; CT=12"; S=3%" max.	do	do	For drilling and tapping. Uses standard reversing motor.	
W 20 ETHL Bench	do	do	do	For drilling and tapping. Uses specia high reversal motor.	
15" Floor Type	D=15"; C=46"; CT=39%"; S=3½" max.	T=12"x10" B=21½" dia. 11"x9" machined surface	do	Models for drillin drilling and tappi	
20" Floor Type	D=20"; C (Spindle nose) =44"; CT (Spindle nose) =35"; S=4½" max.	T=14"x18" B=13½"x14%"	do	using standard reversing motor. For special applica- tions high reversal is available.	

Company can furnish multiple multishaving a single work table using 15" or 20" heads. 15" units with 2 or 3 heads mounted on table; 20" units with 2, 3 or 4 heads. Table sizes: 15"-2 heads, 17\%"x45"; 15"-3 heads, 17\%"x67"; 20"-2 or 3 heads, 24\%"x70\%"; 20"-4 heads, 24\%"x105\%".

Type and Model	Drilling Capacity	Range D=Will Drill to Center of C=Collet Nose to Table	Table T=Vert. Table Travel WT=Work Surface of Table S=Spindle Travel	Speeds and Feeds S=No. and Range of Speeds F=No. and Range of Feeds
Drilling Machine 1-UDA air controlled	No. 60 to ¼" No. 1 Morse Taper	D=14½" dia. C=4½" min. and 16¼" max.	T=11%"; WT=16%"x10%" S=Stroke of drill head 2"	\$=2: 950-6750
2-UDA air controlled	No. 2 Morse Taper	D=14½" dia. C=5%" min. and 17%" max.	do	S=2; 635-3450

Type and Model	Capacity of H.S. Drill in Mild Steel	CS=Dist. Center of Spindle to Column Face ST=Dist. Spindle Nose to Table SB=Dist. Spindle Nose to Base	T=Vert. Travel of Table WT=Work Surface of Table S=Spindle Travel	S=No. and Range of Speeds F=No. and Range of Feeds
Drilling Machine No. 410	1" to 1%" No. 3 Morse Taper	CS=12½"; ST=32½" SB=47½"	T=17": WT=18"x20" S=12"	S=9 F=4
No. 415	1½" to 2" No. 4 Morse Taper	CS=10½"; ST=32½"; SB=46½"	T=17"; WT=1/";20" S=12"	S=9 F=9
No. 420	2" to 3" No. 5 Morse Taper	CS=13%"; ST=39" SB=53"	$T = 8": WT = 18" \times 24" S = 12"$	5=9 F=9
No. 315 Production Drill	1½" No. 4 Morse Taper	CS = 10 ³ 2"; ST = 32 ¹ 2" SB = 46 ³ 2"	T=18½"; WT=16"x20" S=12"	S=16: 263 to 1233, or 100 to 408 F=16: .004" to .025", or .010" to .0625", or .015" to .094".
No. 320 Production Drill	2" No. 5 Morse Taper	CS=13 ¹ 4"; ST=39" SB=53"	T=18": WT=18"x24" S=12"	S=12: 97 to 564; 66:386; 129-771; 29-372; F=16; .006037; .003025; .010-077; .0045035; .011090; .011090; .019083;

uth Bend Lat	he Works	South Bend 22, Indian		
Type and Model	Drilling Capacity C.I.=Cast Iron S=Steel	Range C=Center of Spindle to Column Face S=Spindle Nose to Table	Table T=Vert. Table Travel WT=Work Surface of Table S=Spindle Travel	Speeds and Feeds S=No. and Range of Speeds F=No. and Range of Feeds
Floor and Bench 14"-Precision	C.I. and S=½" No. 2 Morse Taper	Drill to Center of = 1412";	WT=10"x10"; S=4"	S=4" 710 to 4470
		Chuck to Table, floor=40½"; bench=11¼" Chuck to base, floor=46¼"; bench=17"		HP=1/4 or 1/2
14"-Economy	do	do	do	do

Also available, with same general specifications as above, multiple spindle drill presses. Four-spindle: Work table surface=13% "x55": four-spindle bench drill press same as four-spindle. Two-spindle: Work table surface=13% x29" for floor type. Bench is the same.





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Type and Model	Model Spindles Travel	WT-12, WT-14, WT-20, WT-26= Working Surface of Table on Models having 12, 14, 20, or 26" Swings	5=No. and Rang of Speeds F=No. and Rang of Feeds			
Drilling Machine Motor Spindle No. I-1 Spindle No. I Series available in 12" and 20" swings	C=%" D=9"	D=16" VT=11" S=3"	WT12=12\%"x12" WT20=20\%"x20\%"	S=4; 600-1800, or 600-3600		
No. 1-2 Spindles	do	do	WT12=21½"x12" WT20=29½"x20¾"	do		
No. 1-3 Spindles	do	do	WT12=30½"x12" WT20=38½"x20%"	do		
No. 1-4 Spindles	do	do	WT12=39%"x12" WT20=47%"x20%"	do		
No. 1-5 Spindles	do	do	WT12=48%"x12" WT20=56%"x20%"	do		
No. 1-6 Spindles	do	do	WT12=57%"x12" WT20=65%"x20%"	do		
No. 2-1 Spindles No. 2 Series available in 14", 20", and 26" swings	Takes No. 2 Morse Taper D=11"	D=29" (Spindle Nose to Table); VT=9" (Vert. Adj. of Head): S=5"	WT14=15½"x15½" WT20=23"x20%" WT26=26"x25¼"	S=4; 600-1800 or 600-3600		
No. 2-2 Spindles	do	do	WT14=25"x15½" WT20=34"x20¾" WT26=37"x25¼"	do		
No. 2-3 Spindles	do	do	WT14=36"x151/2" WT20=45"x20%" WT26=48"x251/4"	do		
No. 2-4 Spindles	do	do	WT14=47"x15 ¹ 2" WT20=56"x20%" WT26=59"x2514"	do		
No. 2-5 Spindles	do	do	WT14=58"x15"4" WT20=67"x20%" WT26=70"x25%"	do		
No. 2-6 Spindles	do	do	WT14=69"x15½" WT20=78"x20¾" WT26=81"x25¼"	do		

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Makes inside slotting cutting faster, easier, cleaner. Punch and die arrangement of 5 blades assures accuracy, clean cutting action. Cuts 2½ 72,77 slot at one stroke. Threat design permits pivoting work at any point in stroke for special inside cuts. Note sample outs at left.

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he Foote-Burt Co	ompany			Cleveland 8, Ohi
Type and Size	O=Overhang of Spindle C=Capacity in C.1. C5=Capacity in Steel	D=Dist. Between Spindle Centers T5=Max. Dis'. Table to End Spindle Nose WT=Work Surface, Table	ST=Spindle Traverse M=Morse Taper	S=No. and Range of Speeds F=No. and Range of Feeds
Sensitive Drilling No. 2-12"— 1 Spindle	O=12"; C=%"; CS=%"	D=10"; TS=32'4"; WT=23'%"x24"	ST=15½"; M=No. 2	S=570-2300; 855-3450; 710-2875 All units can be furnished for tapping capacity=%"-11 pitch N.C. Tapping
No. 2-12"— 2 Spindle		D=10"; TS=32¼"; WT=2348"x32"		speeds are 300-490-765.
No. 2-12"— 3 Spindle	Same specifications for all models	D=16"; TS=32%"; WT=23%"x44"	Same specifications for all models	Same specifications for all models
No. 2-12" 4 Spindle		D=10"; TS=32 ¹ 4"; WT=22 ¹ 8"x56"		
No. 2-12"— 6 Spindle		D=10"; TS=29½"; WT=22½"x72"		
No. 2-12"— I Spindle with Special Table		WT=19%"x20"		
No. 2-12"-2 do No. 2-12"-3 do		WT=19% "x28"		
No. 2-12"-4 do		WT=19%"x44"		
No. 2-12"-6 do		WT=18½"x56" do		
Independent Feed Drilling Machine No. 1-4 Spindles	CS=%"	D=5½"; TS=22"; WT=14"x41"	ST=5"; M=No. 3	S=6; 138-500 F=3; ,006"-,016
No. 12-4 Spindles	cs=¾"	D=5½"; TS=17"; WT=17"x71"	ST=5"; M=No. 3	do
No. 2-4 Spindles	CS=1%"	D=6": TS=25". WT=17"x71"	ST=9": M=No. 4	S=6; 63-253 F=3; .006014"
No. 3-6 Spindles	cs=1%"	TS=25"; WT=20"x115"	8T=9"; M=No. 4	S=6; 47-296 F=3; .006"014"
No. 4-4 Spindles	CS=2"	D=8": TS=30": WT=19"x92"	ST=11½"; M=No. 5	S=6; 28-188 F=3; .006"014"
No. 5-6 Spindles	CS=2"	D=8"; TS=30"; WT=21"x115"	ST=11½"; M=No. 5	do



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Type and Size	O=Overhang of Spindle C=Capacity in C.I. CS=Capacity in Steel	D=Dist. between Spindle centers TS=Max. Dist. Table to End Spindle Nose WT=Work Surface Table	ST=Spindle Traverse M=Morse Taper	S=No. and Range of Speeds F=No. and Range of Feeds
No. 17-2 Spindles	CS=2"	D=8"; TS=31"; WT=17"x71"	ST=11%"; M=No. 5	do
No. 4½ 4 Spindles	CS=3"	D=9": TS=31"; WT=25"x74"	ST=13": M=No. 5	S=5; 41-277 F=3; .005015"
No. 51/2-6 Spindles	CS=3"	D=9"; TS=31"; WT=25"x116"	ST=13": M=No. 5	do
Multiple Spindle Fixed Center No. 1516-D, Mechanical	H=Head Drive Shaft to Ways, 6" to 12" T=Max. Dist. Bot. Slide to Table=34\4" B=Max. Dist. Bot. Slide to Base=46\2"	WT=18½"x28"	H=Head Travel=12½"	7% h.p.
No. 15%-F, Mech.	H=8%"; T=39%" B=52"	WT=22"x36"	H=12½"	15 h.p.
No. 16, Mech.	H=10"; T=35%"; B=48%"	WT=25"x40"	H=16"	25 h.p.
No. 15½, Hydraulic	H=12%"; T=36%"; B=48%"	WT=22"x36"	H=12"	15 h.p.
No. 16, Hydraulic	H=13½"; T=35½"; B=48"	WT=25"x40"	H=16"	25 h.p. base is 32"x48"; sad re: 95-1140, or 80-9 %" top in steel; or }

Rockwell acquires new companies

W. F. Rockwell, Jr., president of Rockwell Manufacturing Co., has announced the acquisition of the Deluxe Saw & Tool Co. and the Karbide King Tool Corp.

The newest members of the Rock-well family of companies started in business in 1945 and operate plants in Chicago, Ill., and High Point, N. C. Beyond the new product functions of these plants they house extensive service facilities.

The election of Fred A. Collinge as chairman of the board and of John A. Collinge as president and general man-

ager, is announced by the G. M. Diehl Machine Works, Inc., of Wabash, Indiana, manufacturers of precision woodworking machinery.



John A. Collinge



Fred A. Collinge

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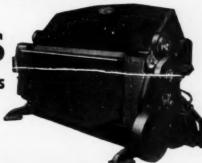
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Fosdick Machine T	ool Co.			Cincinnati, Ohio
Type and Size	O≡Overhang Cl=Capacity in Cast Iron C≡Center to Center of Spindles	SB = Spindle to base, Min. and and Max. TS = Table to Spindle, Min. and Max. S = Spindle Traverse MT = Morse Taper	TT=Table Traverse, Vert. TW=Table Work Surface BW=Base Work Surface	S=No. and Range of Speeds E=No. and Range of Feeds in thousandths
Sensitive Drilling Machines				S=6 and 9:
No. 4BM-1 Spindle	CI=1"; O=12"	TS=½" to 31"; S=6" MT=20	TT=16"; TW=24"x24"	225-1800; 110-1800; 110-900; 55-900; 450-3600; 220-3600 in 6 speeds. 225-1800; 110-1800; 110-900; 55-900; 450-3600; 220-3600 in 9 speeds. F = 4; 1½, 3, 6, 12.
No. 4BM-2 Spindles	C1=1"; O=12"; C=12	do	TT=16"; TW=24"x36"	do
No. 4BM-3 Spindles	do	do	TT=16"; TW=24"x52½"	do
No. 4BM-4 Spindles	CI=1"; O=12"; C=12%"	do	TT=16"; TW=24"x62"	do
No. 4BM-5 Spindles	CI=1"; O=12"; C=12"	do	TT=16"; TW=24"x71½"	do
No. 48M-6 Spindles	do	do	TT=16": TW=24"x84"	do
No. 5BM-1 Spindle	CI=1½"; O=12"; C=14"	TS=0" to 29½"; s=6"	TT=15"; TW=24"x24"	do
No. 5BM-2 Spindles	do	do	TT=15"; TW=24"x38"	do
No. 5BM-3 Spindles	do	dα	TT=15"; TW=24"x52"	do
No. 5BM-4 Spindles	do	do	TT=15"; TW=24"x66"	do
No. 5BM-6 Spindles	do	do	TT=15"; TW=24"x94"	do
No. 4BMR	O=12"; CI=1"	SB=34%" to 47%" Other Specs. same as No. 4BM Series	TT=19½"; Other Specs. same as No. 4BM Series	do
No. 4BMR, Heavy	O=12"; CI=1"	SB=33½" to 50½" do	TT=19" do	do
No. 5BMR	O=12"; CI=1½"	SB = 34% " to 48" Other Specs, same as 5BM Series	TT=19\%" Other Specs. same as No. 4BM Scries	do
No. 5BMR, Heavy	O=12"; CI=1%"	SB=34"x51" do	TT=18";	do

Type and Size	O=Overhang CI=Capacity in Cast Iron Center to Center of Spindles	SB=Spindle to base Min. and Max. TS=Table to Spdl. Min. and Max. S=Spindle Traverse MT=Morse Teper	TT=Table Traverse, Vert. TW=Table Work Surface BW=Base Work Surface	S=No. and Range of Speeds F=No. and Range of Feeds in thousandths
Heavy Duty Upright 25" Round Column	CS=Center Spindle to Lower column=12½2" SW=Swing in Plane of Table= 12½5"	SB=18" to 48" TS=31" max. S (Feed)=12" or 12\frac{1}{2}"; MT=No. 4	TT=18"; TW=23" Round BW=21"x231/4"	S=12: 60-1500 F=9: 5 to 43
25" Box Column	CS=12½"; SW=11½"	SB=16" to 46" TS=34" max.; S=12" or 12½"; MT=No. 4	TT=16"; TW=19"x24" Box	do ·
30" Round Column	CS=15"; SW=15"	SB=21" to 51" TS=32" max; S=12" or 12½"; MT=No. 4	TT=18"; TW=28" Round; BW=25"x28"	do
30" Box Column	CS=15"; SW=15"	SB=21" to 51" TS=37" max., S=12" or 12½"; MT=No. 4	TT=16"; TW=24"x30" Box	do
	Gang drills on 25" and 30" machines, dist, between spindle centers is 30" min, dist, spindle to table is 33". Working surface (two-spindle machine) is 19"x54" or 25", and 24"x60" on 30" machine; for each additional unit ad 30". Compound tible, working surface is 18"x36". Dist. (max.) table to spindle nose is, 23½" for 25", and 29½" for 30" machines.			



Standard Tool Co. of Cleveland, Ohio, manufacturers of cutting tools, have announced the erection of a branch office at Dallas, Tex., at 1621 Dragon St.

Paul E. Lees, president of Standard, announced the establishment of the Dallas branch to aid distributors in Texas, Oklahoma, southern Kansas, Arkansas and western Louisiana.

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A Blueprint for Manpower Mobilization ... part 4

by Edmund Mottershead, Mottershead Associates

Employee training pays off in increased productivity

EMPLOYEE training in the past decade has taken on a kind of magic aura so that some men in management have come to feel that they can accomplish almost anything simply by starting another "training program." The fact of the matter is that training, as such, without motivation on the part of the trainee, accomplishes little or nothing. In a very literal sense, you can't "teach" anyone anything—you can expose them to the truth or knowledge or skill, but they themselves must WANT TO LEARN before any real learning can take place.

Four training objectives

There are four basic training objectives facing industrial management wishing to "train" their employees: the development of good and effective attitudes towards the job, the company, and the supervisors; the passing on of a body of general and specific knowledge about the plant, the industry, the department, etc.; the development of specific job skills; and the nurturing of specific and desirable work habits.

(1) Attitude training

Attitude training implies the establishment of what constitutes a "desirable worker attitude." This may be stated specifically in terms of production quota, attendance record, loyalty, punctuality, apparent competitive spirit, morale, or other factors depending upon the situation and upon management's objectives.

Such training is basic to all others, not only because employees must want to learn in order for other training to be effective, but because the great majority of problems recognized by supervisors fall into the category of employee attitude problems.

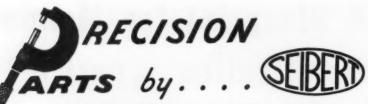
Matters such as apparent loafing, unwillingness to cooperate, tardiness, too much time out, absenteeism, excessive scrap and rework, excessive accidents, and a host of other cost-increasing factors can usually be traced to employee attitude—and, in turn, to supervision.

(2) Knowledge

Knowledge is distinguished as what the worker should "know" as apart from what he "does" or should do. He should know and understand certain matter of company policy, rules, regulations. He should know something of the industry of which he is a part. He should know something of his future with the company, something about its pension and bonus plans and a host of similar factors. General knowledge of his trade or craft as apart from specific job skills is also part of the great body of information which it is usually desirable to convey to employees.

(3) Job skills

Specific job skills must usually be imparted directly on the job, even though the new employee comes to work fully competent and with previous experience in operating the type of equipment now given him on his new assignment.



MULTIPLE SPINDLE DRILLING EQUIPT.

• Shur-Lock Adapter Assemblies (Fig. 1) • Slip Spindle Assemblies (Fig. 2) • Universal Joints (Fig. 3) • Lower Joint Assemblies (Fig. 4) • Upper Joint Assemblies (Fig. 5) • Pinion Drive Shefts (Fig. 6) • Bracket Spindle Assemblies (Fig. 7) • Arms (Fig. 8).

LOWER JOINT ASSEMBLIES

Shafts and keys of high carbon steel, aircraft type Universal Joints with forks, center blocks and pins made of alloy steel, heat treated. Joints bored and pinned, with keyway to fit shaft if required. Bored to fit Spindle end, with keyway machined.

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Sleeves made: I Alloy Steel with ground finish. Keyway held to close tolerances. Also supplied with keymachined in sleeve where lower drive shaft has keyway. Universal Joint assembled to sleeve and pinned, bored to fit Pinion Drive Shafts.

AN INVITATION

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Compare our prices with the cost of machining Universal Joints and processing shafts or sleeves in your tool room.

Write for informative catalog and get our quotations.



(4) Work habits

Even though the individual may have adequate skill in performing his job, his habits of work may be so sloppy or so indifferent as to render his production unprofitable. Such work habits are a proper part of worker training both by fermal programs and by daily supervisi n, although the daily supervisory activity of his immediate boss is by far the greatest factor in the in-

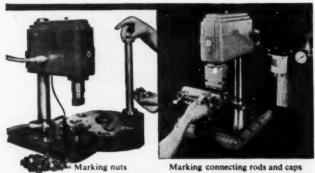
dividual's work habits.

Matters such as safety, quality, precision, neatness, care of work place, care of equipment, reporting of trouble promptly, tardiness, absenteeism, and over-all production are all elements which can be put on the basis of good work habits.

Types of training

Not every type of training is most

Ø.



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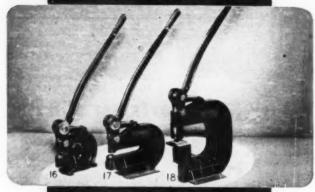
effective in all situations or for all of these purposes. Orientation programs are most effective in beginning the development of worker attitudes; vestibule training programs are especially useful in providing basic machine or tool skills for shops which have these skills and tools in wide use in many departments.

On-the-job training is effective in imparting both attitudes and specific job skills, but it suffers from its inter-

mittent and catch-as-catch-can nature due to interruptions which demand the time and attention of the supervisor.

Vocational school programs, both in the school away from the plant and special courses which might be conducted in-plant, have the advantage of providing skilled trainers or instructors who put across a particular body of information, but many times this information is not sufficiently related to specific jobs in the plant. In-plant

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NOS. 16-17-18 BENCH PUNCHES

Roller-bearing, lever-type punches designed for bench use. No 18 has higher and deeper throat than Nos. 16 and 17; comes with adjustable die shoes to permit use of close-fitting punches and dies. Capacity: — mild steel: (No. 16 — 3/8 thru 1/4); (No. 17 — 1/4 thru 1/4); (No. 18 — 1/11 thru 1/2 ga.).

WHITNEY METAL TOOL COMPANY

courses, for example, a course in blueprint reading, may be job-applied by using company prints of parts or pieces actually fabricated by the men and women learning to read the prints.

Apprenticeship programs are well established and generally recognized as being among the soundest programs for long-range development of craft skills. However, the very slowness of the programs—typically 4 years—coupled with the differential wage levels tied to the

programs discourages employees from becoming apprentices because they can get higher immediate earnings as machine operators without bothering to endure a 4-year training program. This has resulted, in may areas, in definite shortages of apprentices coming up through the ranks to replace the thousands of old timers who are nearing retirement age in many crafts.

Safety training as such cannot be separated from on-the-job skill train-



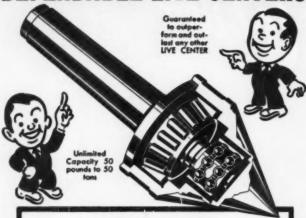
3 or 4 jaw lever operated universal chucks center and hold work. A standard tapered hole in the spindle provides for holding combination or twist drills of suitable size. Spindle traverse is actuated by a feed lever. Machine is completely motorized. Also available are single spindle single head screw feed floor and bench types as well as single spindle double head centering machines. Write for Bulletin C-1 now.



ing, as it usually involves instruction in the correct-and-safe way to do a job. However, there are usually other hazards in the plant besides those on the particular job, and both special programs and supervisory activity have a part to play in this type of employee training.

Daily supervision, in the last analysis, is the largest part of the training any employee receives. The foreman has a definite responsibility in this field which he discharges either consciously or not. If his actions and example are unplanned, his workers will develop certain attitudes, will gain certain knowledge, acquire certain skills and work habits, some of which may not be entirely desirable from management's standpoint. If the foreman is effective as a trainer, he is conscious of the 4-fold training problem and aware of his every action as having

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MARVEL TOOL & MACHINE CO.

ST. CLAIR, MICHIGAN

some bearing upon the effectiveness of his training efforts.

Job shop training problems

In the typical "job-shop" where a wide diversity of products are turned out to the customer's order, on-the-job training frequently becomes a very complex proposition involving training of the worker on numerous and different operations. Because of this, it is in the job-shop that the apprentice

training programs frequently have their greatest usefulness, as the trainee is getting broad and basic training along with specific job training over a period of time so that the immediate jobtraining efforts of the supervisor or lead man are reinforced with long-range training which will over a period of time create a skilled all-around man.

Orientation programs, safety training, and efficient supervision on a con-



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TOOLS FOR INDUSTRY

tinuing basis are usually the most profitable types of training for management to employ in these situations. Where apprentice programs are not available for some reason, the local vocational school can serve to develop specific courses of instruction which will supplement the department head's activities.

Assembly and line production training

Many companies engaged in small

parts assembly operations involving the use of screw drivers, pliers, soldering irons, and similar small and basic hand tools, have found the vestibule schools, especially for women workers, are a profitable operation. They serve to familiarize the new workers quickly with the necessary manual skills and tool functions without placing an undue burden on the supervisor who must introduce the new worker to the spe-





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THE RUTHMAN MACHINERY CO.

cific operations of the job.

Job instruction sheets are currently in use in many companies, placed prominently in the work place at eye level for the employee, so that there is a constant and specific reminder of what to do next, how to do it, what quality or safety "key points" to watch for, etc. Some of these sheets include drawings or blueprints, or parts of prints. Others are made even more visual with the use of photographs in

series corresponding to the various job operations.

Line production training of workers is often found to be most economical and effective by delegating training functions to an older and experienced worker who is pulled off from "production" and given special status—and pay—as an instructor. Such a person is closer to the problems and difficulties of the new worker than the usual supervisor, and also has full time to



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devote to instructional duties without other interruptions and responsibilities.

Handicapped workers are also benefitted by the use of vestibule type training, particularly where the training can be built around a particular type of handicap common to a group of such people hired. Men who have lost an arm or hand, for example, or blind people, can frequently be grouptrained in basic tool skills and job

operations before being put on the assembly or production line.

Set up your target — pick your method — check results

In beginning any employee training program it has been found advisable to start one thing at a time. One specific production need to be met with training can be analyzed, a program developed and set into motion on a basis which permits evaluating results. Start-





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various type reflectors, arms
and bases for every industrial

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Ing too many at once removes both much of the orderliness and much of the possibility of accurate cost and profit analysis from the effort.

After the one program has been set up and gotten under way, it can readily be coordinated with other programs which may also be in existence. Particularly, training programs should be coordinated with programs relative to safety, plant rules, company policy, scrap, absenteeism, suggestion system, etc.

Management participation is essential to the effectiveness of any employee training. Not that top management must necessarily sit in on training sessions, but management must have a part in planning and supervising the program, and should get periodic progress reports on results and costs saved. In the last analysis, the only question that management is really concerned about is: "Is

	ATTITUDES	KNOWL- EDGE	JOB SKILLS	WORK HABITS
ORIENTA- TION	To develop atti- tudes towards: Job, Company, Quality, etc.	Of company peli- cy, plant rules, etc. Of job benefits, etc.		Explain standards of what consti- tutes a "good job" or a "fair day's work"
VESTIBULE	Towards quality and precision, etc.		Use of basic tools, special skills	Carefulness, pre- cision, accuracy, etc.
ON-THE- JOB	Develop attitudes to job, depart- ment, supervisor, etc.	worker's place in	Specific skills used in perform- ing the particular	neatness, care of
VOCA- TIONAL SCHOOL Courses— Out of plant	Towards the par- ticular industry and/or commu- nity	ness subjects tho usually not di-	Basic and specific machine skills, etc. Not neces- sarily job-applied	Basic habits of ac- curacy, quality, safety, etc.
VOCA- TIONAL SCHOOL In-Plant Special Courses	Towards company	Technical or business subjects— job applied		Specific habits of work, neathers, quality, etc.
APPREN- TICESHIP	Towards the work in general as well as towards the company "Craft" attitude		Thorough over-all skill training in specific trade	"Traditional" work habits of the craft
SAFETY	Towards hazards, company, and su- pervision		Skill in correct and safe job per- formance	Habits of safe workmanship
DAILY SUPER- VISION	Attitude to company, job, super- visor	Of plant and de-	Specific job skills	Habits relative to quality, neatness, punctuality, speed, productivity, safe- ty, etc.

the training program helping production?" If your employee training is specifically set up to help specific production problems, geared into other plant programs, and with a basis provided for measuring results, you will find that it will help production whether your operation be job-shop or line production. Training, though not a cure-all for production and industrial relations problems, can still be used intelligently as a tool for greater utilization of existing manpower and increasing productivity per manhour.

End of part 4.

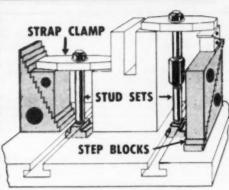
Famco moves to Kenosha, Wis.

H. B. Noll, President of Famco Ma-

chine Co., has announced the purchase of new plant and office facilities at Kenosha, Wis. This purchase is part of an expansion program undertaken by Famco. In addition to replacing Famco's two Racine, Wis., plants enabling more efficient operation in one location, the new buildings add approximately forty thousand square feet of floor space to Famco's operation. The plant is situated on twelve acres of land making possible further expansion as needed. It is expected that the move will be completed during the month of June.

The company manufactures a complete line of arbor presses, power presses, squaring shears, drill presses, metal cut-off band saws, foot presses and air presses.

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THE TIETZMANN LINE OF TIME AND MONEY SAVING ACCES-SORIES FOR YOUR SHOP BALL BEARING PARALLEL

Now available is a Tietzmann Ball Bearing Parallel for heavy and medium work support movement. Bearing balls of support movement. Bearing balls of \$\frac{4}{9}\tilde{m}'\ dia., are assembled in a steel plate \$\frac{1}{2}\tilde{m}'\tilde{m}'\tilde{m}'\ . The Parallel is especially adapted for band saw work, and drill presses. Tietzmann Ball Bearing Parallels are supplied in sets of 4 packed in a hardwood carrying case. \$12.00 per set complete.





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Available for Table slots $\frac{3}{8}$ " to $\frac{11}{8}$ ". Stud sizes from $\frac{3}{8}$ " to 1". Each size set consists of 40 pieces.



sold in sets and single blocks



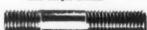
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ZMANN TOOL CORP. ENGLEWOOD, OHIO



Operating on a unique principle, a line of machines known as Hydroform, manufactured by the Cincinnati Milling Machine Co., Cincinnati 9, Ohio, have been announced in 12" and 26" sizes and are available up to 40".

These metal forming units operate on the principle of a solid punch member moving into a flexible, hydraulically pressurized die member-actually an oil cavity capped with a flexible diaphragm. Sheet metal between these two members is hydraulically formed to the shape of the punch. In operation, the flexible die member is lowered and locked, initial pressure is released, and then the punch member moves upward into the flexible die member. The blank is pressed tightly against the draw ring (surrounding the punch) to control metal flow. As the punch moves up, pressure is automatically increased on the blank being formed, and the metal is subjected to uniform pressure from all sides. Stripping is accomplished automatically as the punch is retracted.

Matching die sets are not necessary. Tools consist of a simple draw ring and a punch made in the shape of the part being formed. Because of the hydraulically controlled forming principle, the surface of the metal being formed is

not scuffed or scarred and little or no abrasive action is imposed on the punch it is claimed.

Hydroform machines consist basically of the heavy base in which the bolster plate and punch are mounted, a dome which contains the flexible die member, and four strain rods for containing these units. The hydraulic system is equipped with a cooling unit to maintain the proper oil temperature. Electrical push buttons, manual control levers and setup elements are all grouped at the operator's working position. An automatic cycle control unit is arranged with adjustable dogs or master cam plates to control the complete cycle, including increased pressure in the dome, if desirable, while the piece is forming. Maximum pump pressure developed by the hydraulic system is 8,000 p.s.i., although up to 15,000 p.s.i. may be generated in the flexible die member as the punch moves up during the forming process.

To promote safety, the dome is interlocked in its up position while loading and unloading and in its down position while the work is being formed. The dome control lever can be moved only after a function has been completed. A two-position "form speed" control lever regulates the speed of





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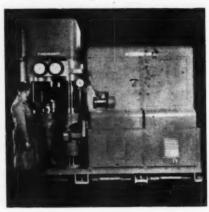
1901 JOHNSON FURNACES FOR INDUSTRY



Inspecting a sheet steel cover, drawn from .075" stock in one operation by a Cincinnati 26" Hydroform machine.

the forming stroke, giving the operator a choice of high or low forming speed to suit the material and size and shape of the part. The flexible diaphragm unit is made up from two layers of material—the wear sheet and

Cincinnati 12" Hydroform machine. They are marketed in 26" also and can be obtained in sizes up to 40".



B-R-E-A-K

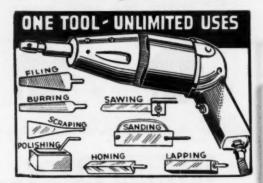
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it. Coprecision. Worn and undersized armature shafts, axles, spindles, pins enlarged to permit parts to be re-used. Knurled surfaces may be machined. Deep-cut grooves retained to hold lubricants.



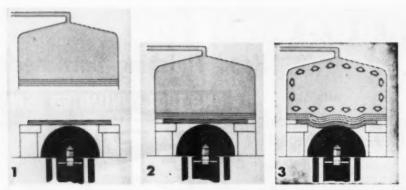
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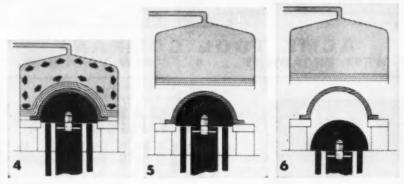
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(1) Blank is placed on draw ring: (2) flexible die member is lowered and locked into position; (3) pressure in flexible die member is established to a predetermined setting.



(4) Punch is moved upward into flexible die member; (5) flexible die member is raised; (6) punch is stripped from finished part.

the inner member which confines the hydraulic oil in the forming cavity. Both are easily replaced.

Fewer drawing operations and anneals are required to form either simple or intricate shapes since most parts can be formed in a single continuous operation, with percentage or reduction in the draw far greater than conventional practice. There is no gap at the start of the draw but rather a continuous contact with the flexible die member and a good initial wrap around the punch. In the cases where more than one operation is needed on the

Hydroform, two or three blanks can be stacked together and preformed in one stroke. Stripping is accomplished automatically as the punch is rectracted. The machine often can be tooled to trim and form in the same operation.

Since the built-in flexible die member serves as a universal die, dies and matching sets are unnecessary. Tools require no fastening. Ability to accurately control blank holding presure saves time in development of a new part and parts can be examined in midstroke. Changeover of tooling is

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improved work is said to result since thin-out, spot stresses or springback are greatly reduced or eliminated. This comes from continuous wrap-around action and controlling forming pressure evenly distributed over the entire blank during the forming of parts.

Inexpensive tool materials can be used for Hydroforming without heat treatment. Tools can be made of hard woods, Kirksite, brass, alum num, cast iron and steel depending on the quantity and shape of the part to be formed.

Die maker's fit is eliminated since the clearance between the punch and the contoured draw ring is usually 58% or more of the thickness of the material being formed. There is no need for overhead tooling as the punch is mounted in the base of the machine. Draw ring supports are designed to standard specifications so as to fit the bolster plate and facilitate changeover from one set of tooling to another.

The method has wide application in many industries including automotive, aircraft, machine tool, food, appliances, electrical, lighting and television.

Specifications for the 12" and 26" machines respectively, are: Maximum blank diameter, 12" - 26"; maximum draw depth, 7" - 12"; maximum flexible



High pressure reset cap, made from W' mild steel. Tool of mild steel. Tool cost, 71/2 hours. One operation.

die member pressure 15,000 p.s.i.

ame: maximum blank gage, " steel

ame: maximum rate, 130 cycles per

bour 90 cycles per hour; machine net

vt. 38,000 162,000 dimensions, 11'6'x

6'3'x9'8" high 7'x7'x12" (above floor

level) power plant and tank, 71"x141"x

45" high: installation, floor mounted

with water and electrical connections

pit mounted with power plant in pit

178'x264"x84" deep; oil capacity, ap
proximately 200 gals. 400 gals.



Manifold section, made from 1/16" statinless steet. Tool of mild steet. Tool cost 144's hours. One operation.



Ornamental cup, made from 1/32" sterling silver, Tool of mild steel, Tool cost, 9 hours. One operation.



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fast and simple as tools are self-centering, easy to locate, making for quick setups.

Improved work is said to result since thin-out, spot stresses or springback are greatly reduced or eliminated. This comes from continuous wrap-around action and controlling forming pressure evenly distributed over the entire blank during the forming of parts.

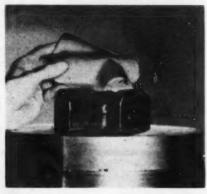
Inexpensive tool materials can be used for Hydroforming without heat treatment. Tools can be made of hard woods, Kirksite, brass, alum.num, cast iron and steel, depending on the quantity and shape of the part to be formed.

Die maker's fit is eliminated since the clearance between the punch and the contoured draw ring is usually 50% or more of the thickness of the material being formed. There is no need for overhead tooling as the punch is mounted in the base of the machine. Draw ring supports are designed to standard specifications so as to fit the bolster plate and facilitate changeover from one set of tooling to another.

The method has wide application in many industries including automotive, aircraft, machine tool, food, appliances, electrical, lighting and television.

Specifications for the 12" and 26" machines respectively, are: Maximum blank diameter, 12"-26"; maximum draw depth, 7"-12"; maximum flexible

die member pressure, 15,000 p.s.i.—same; maximum blank gage, %" steel—same; maximum rate, 180 cycles per hour—90 cycles per hour; machine net wt., 38,600—162,000; dimensions, 11'6"x 6'3"x9'8" high—7'x7'x12' (above floor level) power plant and tank, 71"x141"x 45" high; installation, floor mounted with water and electrical connections—pit mounted with power plant in pit 178'x264"x84" deep; oil capacity, approximately 200 gals.—400 gals.



Manifold section. made from 1/16" statinless steel. Tool of mild steel. Tool cost, $14\frac{1}{2}$ hours. One operation.



High pressure vessel cap, made from 1/4" mild steel. Tool of mild steel. Tool cost, 71/2 hours. One operation.



Ornamental cup, made from $1/32^{\prime\prime}$ sterling silver. Tool of mild steel. Tool cost, 9 hours. One operation.



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and Wheels.

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Milling Machine Vise
An improved vise which provides
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Manufacturers of High Speed Milling Attachments and Turret Milling Machines

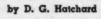
R-F generator equipment for V-way hardening

THE CHAMBERSBURG Engineering Co. has two 20-kw r-f generators which they use in parallel to give a total output of 40 kw. Chambersburg first purchased a single 20-kw generator for hardening applications other than V-ways and added the second 20-kw unit at a later date.

It is a relatively simple matter to parallel these r-f generators. In some instances, where they will be applied to a number of different hardening jobs, it is possible to achieve more efficient loading for them when they operate separately. If only V-ways are to be hardened, it would be more desirable to use a single 50-kw r-f generator, since it provides a unified installation that is easier to control and is actually less expensive, from the standpoint of initial cost as well as operating and maintenance costs.

R-f generator equipments are essentially frequency changers for converting 60-cycle power to r-f power. Principal components are:

- A plate transformer which steps up the 60-cycle line voltage to a high value.
- 2. Rectifier tubes in a three-phase, full-wave circuit which converts



Industrial Electronics & X-Ray Division Westinghouse Electric Corp. Baltimore, Md.

the alternating current to direct

- Oscillator tubes which act to convert the direct current into pulses of the desired radio frequency.
- A tank circuit which, being a resonant circuit, is excited by the pulses, developing a high circulating current and high r-f voltage across it.

While two 20-kw sets arranged for individual or parallel operation make a versatile installation, the 50-kw generator fits most closely the requirements of V-way hardening. Figure 1 is a front view of the 50-kw unit. All the necessary controls and meters for operation are mounted on the front panel. Cooling air is drawn into the generator



Front view of the 50-kw r-1 generator . . .
 All controls and meters for operation are mounted on the front panel.

through louvres at the base of the equipment, and exhausted through vents at the top. The cubicle is actually in two sections for ease of handling, one the rectifier, the other the oscillator.

Figure 2 shows the rectifier cubicle with relay panel in the closed position. The meters and relays on this panel provide oscillator plate and grid overload protection, time delays which prevent starting the equipment before the filaments have warmed up and prevent shut-down of cooling air and water before the equipment has cooled down sufficiently. The panel also contains miscellaneous control contactors, timer and total hour meters to record expired tube life.

Figure 3 shows the rectifier cubicle with the relay panel swung open. This panel is interlocked so that it is impossible for personnel to enter the rectifier cubicle without shutting down the high voltage. The three-phase full-wave rectifier makes a desirable high power factor balanced load.

The interior of the oscillator cubicle is shown in figure 4. The water cooled WL-895 oscillator tube mounts in the socket at the left and air ducts direct temperature controlled cooling air on the tube seals. The high-voltage plate transformer connects through the cubicle wall to the rectifier circuit. The tank circuit, consisting of inductance and capacity, is in the forward portion of the oscillator cubicle.

The 50-kw generator operates from 440-volt, three-phase, 60-cycle power and delivers an output of 50 kw at 450 kc. Cooling water for the oscillator tubes and tank circuits is required at the rate of approximately 30 gallons per minute. The work coil circuit requires approximately four gallons per minute. If water for cooling purposes is too costly or insufficiently pure for use

2. The rectifier cubicle with relay panel in the closed position. The meters and relays on this panel provide oscillator plate and grid overload protection. The panel also contains miscellaneous control contactors, timer and total hour meters to record expired tube life.



MACHINE and TOOL BLUE BOOK



3. The rectifier cubicle with the relay panel swung open. This panel is interlocked so that it is impossible for personnel to enter the rectifier cubicle without shutting down the high voltage.

in the r-f generator, there are standard closed cooling systems or water economizers specifically designed for use with these equipments.

In practically all hardening applications, it is necessary to reach hardening temperatures quickly and with shallow depth of heating. This requires high power densities at the surface of the workpiece and, since the heating is a direct result of I²R losses, it is also necessary that high currents be available from the r-f equipment. R-f generators, and in fact most all electronic equipments are high-voltage, low-current devices. To meet the requirements of induction hardening, a current transformer is normally used in the work circuit.

Referring again to the overall installation at Chambersburg for V-way hardening, figure 5, note that a current transformer is mounted in close proximity to the work coil. There is good reason for mounting it adjacent to the work coil and not at the generator; the 50-kw set has an output current of 325 amps at its output terminals, but this is increased to 1000 amperes or more by the curent transformer. Obviously, power losses even in short transmission lines would be excessive at such currents. Current transformers for use with the 50-kw generator on these hardening applications are available as standard items.

Coil design for this particular application is limited to a hairpin or pancake type coil contoured to the V-way, since it is impossible to encircle the workpiece. The coil coupling factor here is low and the efficiency of power transferred to the work is less than that obtained with ideal coupling. Offsetting this, however, is the distinct advantage of putting the power only where it is wanted, ease of power control, and rapidity of heating. Coil design is based on engineering theory, but in practice a great many coil designs are the direct result of experience.

There are three related factors in the successful application of r-f power which must be carefully considered in this V-way problem. The coil design is probably the most important factor. The others are power available and scanning speed. For a given size of generator and scanning speed, the coil design must be such that the power density at the surface of the V-way under the coil will be sufficient to give hardening temperatures. It must not be so great as to cause burning at the established scanning speed. Seldom is one concerned about overheating the work-



4. Interior of the oscillator cubicle. The water-cooled WL-895 oscillator tube mounts in the socket at the left. The high voltage plate transformer connects through the cubicle wall to the rectifier circuit. The tank circuit is in the forward position of the cubicle.

piece, since it is usually possible to maintain full power of the generator with maximum scanning speed simply by properly adjusting the coil design to reduce the power density at the work surface.

It is usually possible to operate the generator at full power and maximum scanning speed provided the optimum coil design is used. It is helpful, when adjusting coil designs for various V-ways or other hardening jobs which may be assigned to the r-f generator, to have fine control of power. Normally power control is obtained by shutting down the generator equipment and ad-

justing taps on the plate transformer. With this set-up it is only possible to secure a limited number of fixed power positions. The grid-controlled rectifier circuit in the 50-kw generator gives continuous adjustment of power by turning a knob on the front panel of the generator. This is accomplished by phase controlling an a-c voltage applied to the grids of the rectifier tubes. Control of power is continuous from zero to full output while the generator is in operation.

The grid-controlled rectifier circuit can also be used as an electronic contactor on high repetitive short cycle jobs to energize and de-energize the equipment. The advantage to this lies in the precise timing which is possible and in the elimination of wear and tear on the primary power contactors.

The outstanding advantage of r-f heating in V-way hardening is that distortion can be held to a minimum despite the fact that the material is cast iron. Experience shows that for conventional V-ways normally encountered. it can be held as low as four to six thousandths of an inch over a six-foot length. This low distortion is the result of heat concentrated at the surface of the way and relatively fast heating and quenching cycles. The fast heat and quench cycles also practically eliminate oxidation and scale formation. These factors together with the ability of induction heating to give uniform hardness greatly facilitate processing the beds after hardening.

The operating costs and economics of this application are favorable for induction heating. For example, the 50-kw generator can be operated for \$1.75 per hour. This is based on a primary power cost of 1¢ per KWH and raw water cost of \$1.00 per thousand cubic feet. This figure also includes tube replacement costs. It is cheaper to bend up a simple coil of copper tubing to meet the heating requirements of a new V-way shape than to build burners. Probably the



5. Chambersburg Engineering Co. installation for V-way hardening.

greatest savings can be attributed to the easier processing of the V-ways after r-f hardening.

This application of induction heating to hardening V-ways represents another advance of electronic equipment to ever widening production use. The versatility of the r-f generator makes it economical even though production de-

mands of V-ways do not always require its full time use. It is relatively easy to set up other inductor coils and work handling fixtures to perform a wide variety of hardening jobs. R-f heating has the inherent advantage of being adaptable either to large quantity production or miscellaneous small lot applications.



Brothers Mass., recently Beverly, celebrated a "Red Letter Day", marking the completion of the 10,000th mgchine to be produced at the Reid plant, Pictured with the new surface grinder. are, left to right: John Reid, Walter W. Perkins, president: Patrick Ahearn, who has the longest service of the 140 employees in the Reid plant: Andrew Reid. one of the founders; and Robert R. Reid, son of Robert Reid, who also founded the business, one of the most progressive plants in the entire New England area.



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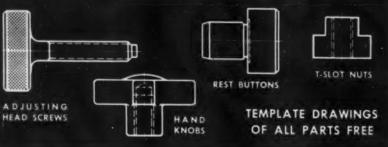
WESPO parts are precision manufactured of quality steel—heat treated and rust proofed. They are made for heavy duty and long usage and have proved their value in many industries.

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- An informative book on cutting tools, including engineering data, tables of speeds, feeds, etc., is available from F. & D. Machine and Tool Works, Three Rivers, Mass.
- 2. A folder telling characteristics and applications of Valve Seal A, a special purpose silicone lubricant, is available—after eight years of laboratory and field work—from Dow Corning Corp., Midland, Mich.
- 3. Their extremely heavy duty, springloaded, self-compensating "Bulflex" is featured in a bulletin on their line of live centers by The Bultool Co., 243 W. Congress St., Detroit 26, Mich.
- 4. An illustrated, instructive comic presentation, "How Polisher Pete Put Economy in Polishing," is available from Behr-Manning Corp., Dept. F.P. No. 1, Troy, N. Y.
- Complete descriptions of the M-80 spline milling machine and their M-96 and M-125 drilling machines are available from The H. P. Townsend Mfg. Co., Elmwood, Conn.
- 6. A "comparison chart" covering five manufacturers of jig and fixture components, including comparative catalog numbers of 11 types and 71 sizes, is offered by writing Northwestern Tool & Engineering Co., 118 Hollier Ave., Dayton 3. Ohio.
- 7. A folder illustrating and explaining

- how to utilize old one-inch pipe in making scaffolding will be sent by writing Amidon Engineering Co., Elyria, Ohio.
- 8. A new advertising brochure, "Matthews 204 General Purpose Marking Machines," from the hand operated models through to the heavy duty fully pneumatic operated models, has been put out by The James H. Matthews & Co., 3942 Forbes St., Pittsburgh 13, Penn.
- 9. "Better, Faster Finishing for Production and Maintenance Jobs" is the title of a new bulletin on industrial sanding applications showing (1) advantages of straight-line sanding action, (2) illustrations showing how air sanders are used for a multiplicity of operations in the plant, and (3) specifications on the four models of Sundstrand air sanders and accessories; it is available from the Sundstrand Machine Tool Co., Rockford, III.
- 10. An informative "Operating Instruction Manual for Automatic Setting Machines," containing detailed information on the care and operation of automatic rivet-setting equipment, is available by writing Machine & Parts Dept., The Milford Rivet & Machine Co., Milford, Conn.
- 11. Two new bulletins covering their line of Hi-Cyclic air and hydraulic operating valves and Beckett drilling

Drill Hardened Steelswithout Annealing –



With the new, improved "HARDSTEEL" Drill, you can do accurate, smooth drilling, countersinking, counterboring and reaming in steels hardened by any process without first annealing the work. And they work with equal ease on work-hardening steels and high carbon high chrome steels of any degree of hardness.

"HARDSTEEL" Drills fit standard drill presses. They save time and reduce rejects. They permit engineering changes requiring additional drilling after hardening. And parts drilled after hardening always match at assembly.

Write for a copy of the "HARDSTEEL" Operators Manual showing how "HARDSTEEL" drills are cutting costs in thousands of plants.

You Harden It—We'll Drill It— With "HARDSTEEL"

BLACK DRILL COMPANY, INC.
1374 East 222nd St. · Cleveland 17, Ohio

Also makers of — BLACK DRILLING UNITS — AUTOMATIC, SELF-CONTAINED — FOR COST-CUTTING PRODUCTION ON ALL MATERIALS

Write for information

and tapping machines, including reciprocating, spring loaded, and handoperated valves, solenoid valves, air time delay valves and piloted valves, are available from The Beckett-Harcum Co., Wilmington, Ohio.

12. A new bulletin explaining the new-ly-developed Atom-Lube system—designed to aid the cooling and lubricating of cutting tools is available from The Henry G. Thompson & Son Co., New Haven 5, Conn.

13. A 24-page bulletin, 270-E1, "Manual of Exhaust Hood Design," featuring engineering data on dust control systems for the metal working industries, illustrating and discussing the design of exhaust hoods for many operations in the fields of polishing, buffing, grinding, portable and flexible shaft grinding and polishing, cast iron machining, automatic buffing and oil mist control, is available from The American Air Filter Co., Inc., Louisville, Ky.



Pratt & Whitney Carbide Hole Finishing Burs are precision ground on special machines to provide the accurate flute spacing, uniform rake angle and exact balance essential for efficient cutting at high speeds. Tolerances: concentricity .0005" (max.); cutting sides parallel within .0002".

Comprehensive stocks of all P & W Carbide and High Speed Steel Burs are maintained at Pratt & Whitney Branch Offices. Request literature on your Company letterhead.



PRATT & WHITNEY

DIVISION NILES-BEMENT-POND COMPANY
WEST HARTFORD 1, CONNECTICUT, U. S. A.
BRANCH OFFICES IN PRINCIPAL CITIES

14. Ingersoll-Rand Co. has just published a comprehensive 36-page catalog covering their complete line of Multi-Cycle electric tools. The catalog covers impactools, nut runners, drills, screw drivers, grinders, buffers, sanders and polishers. For a copy of this new Multi-Cycle electric tool catalog, write Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y., requesting Form 5111.

15. A bulletin describing some of the uses of the borescope, versatile instru-

ment for internal visual inspection, is being mailed after requests to The Lenox Instrument Co., 2012 Chancellor St., Phila. 3, Pa.

16. A new brochure, vividly illustrated and describing their line of dial bore gages, dial indicators, dial snap gages, dial comparators, dializers, DuBo plug gages, adjustable limit gages, master setting gages, and others is available from the Standard Gage Co., Inc., Poughkeepsie, N. Y.



Compact sturdy construction, precision engineered for long, uninterrupted heavy duty operation.

Has small, well protected solenoid—operates small cylinders up to 3" dia. and larger cylinders where unusual speeds are not required.

Quantity and O.E.M. discounts. Write for description, discounts, etc.

IMMEDIATE DELIVERY

For Fast
Operation of
Cylinders
up to
3" Diameter



3-WAY VALVE Same Design only \$1980



AUTOMATIC VALVE CO.
37429 GRAND RIVER AVE., FARMINGTON, MICH.

17. Two new six-page bulletins, printed in two colors, and describing the proper applications of blade types and sizes of Milford metal-cutting saws, ordering data and other information will be sent upon request by The Henry G. Thompson & Son Co., New Haven, Conn.

18. A 52-page booklet pertaining to powder metal engineering with Wesson controls and covering many fields of cutting tools, is available from the Wesson Co., Ferndale, Detroit, 20, Mich.

19. A folder containing a description and specifications of their metal cut-off band saw, bench model weighing only 112 lbs., will be sent upon request, by

the Crowningshield-Harris Co., Country Club Road, Greenfield, Mass.

20. A complete listing of bit holders and and insert bits to drive Phillips, Frearson (Reed & Prince), slotted, clutch head and socket head screws is con-



tained in Catalog 26, sectionalized for quick reference and easy ordering. All bit holders, service drive bit holders and hand drivers available for ¼" and 5/16" hex, and ¼" and 5/16" square insert bits, are carried in separate sections, with the insert bits for each classification included. Apex hand drivers and sockets for 3/16", ¼", 5/16" and 11/32" hex nuts are also catalogued. The catalog will be sent on request (use your company letterhead, please) to **The**

Apex Machine & Tool Co., 1028 So. Patterson Blvd., Dayton 2, Ohio.

21. A new line of high speed forging presses is described and illustrated in a four-page leaflet, identified as Catalog No. 42. It contains complete specifications for the presses ranging in capacity from 300 tons to 4000 tons, and manufactured by The E. W. Bliss Co., Canton, Ohio.

22. A new four-page bulletin describing the new 30"-36"-48" Type CHW plain



F. J. Steel MACHINE CO.

ALE DIVISION

ALE DIVISION

Welle Gor
Correct Offices Detect and Cleveland

grinding machine, designed to accommodate large diameter work pieces such as jet turbine rotors, track carriers, large diameter motor armatures, water valves and similar pieces, can be procured by writing Landis Tool Co., Waynesboro, Pa.

23. A new brochure, "Why the Trend is Toward Production Illustration . . . ," features photos and drawings showing direct applications of "graphics" in production operations and how they quick-

ly explain and illustrate the details and sequence of machining a part and the steps in assembly operations.

Although the technique is especially valuable to semi-skilled or unskilled workers who have difficulty interpreting blueprints, the crystal-clearness of graphic illustrations has proven a profitable aid to personnel on all levels to quickly grasp the structure, size and shape of any part, assembly or machine. For further information write Walter

There's a reason 71%

of all popularly-priced Tool and Cutter Grinders sold in 1951 were "Knock - Outs"



Production Illustrations, 4255 Woodward Avenue, Detroit 1, Mich.

24. A new four page illustrated Bulletin, 87-A, dealing with construction, new features, specifications and operation of their air-powered squaring shears will be sent by writing Niagara Machine and Tool Works, 637-697 Northland Ave., Buffalo 11, New York.

25. A catalog, D-110, illustrating and describing the C-O Cincinnati 14"-3000 sliding head floor drill with ex-

clusive tilting motor bracket for easy speed changes, will be sent upon request to The Cincinnati Lathe & Tool Co., Canedy-Otto Div., Cincinnati 9, Ohio.

26. An informative folder on the Atlantic contour saw showing actual, non-retouched photographs that visibly demonstrate micro-tolerant accuracy in cutting the most intricate contours on all metals including heavy tool steel blanks, may be procured by contacting

the Atlantic Saw Manufacturing Co., Brewery Street, New Haven, Conn.

27. The new 12-page Bulletin No. 152 features steam traps equipped with bellows of bronze, monel or stainless, and bodies in bronze, semisteel and cast steel construction in sizes ¼" to 2", for all pressures from vacuum to 300 lbs. Included, besides capacity tables and dimensions, are recommended piping diagrams, typical applictions, tables and data covering the selection of traps for various types of steam-using equipment. Write W. H. Nicholson & Co., 12 Oregon St., Wilkes-Barre, Pa.

28. A new bulletin on Boylock Cutters, a patented device for mechanically holding and locking metal cutting tool tips, which are easily removed and replaced, and information on a wide renge of special cutting tools, made to specifications, will be sent on request to American Cutter & Engineering Corp., Warren, Mich.

29. Pre-Setting Gages are described and illustrated in a new four-page Catalog

Bulletin No. 19-50; also flush pin gages and height gages, for setting tools used in multiple spindle machines, and a special combination tool board and bench which is designed and built as a part of most tool gaging set-ups. Available from Scully-Jones and Co., 1907 So. Rockwell Street, Chicago 8, Ill. 30. Foredom flexible shaft machines are particularly valuable for use on small irregularly shaped parts which cannot be handled by conventional machine set-ups. An eight-page catalog covers hand-pieces, heavier duty models, rheostats, the 900 series, lighter duty machines, accessories, machine kits, etc. Foredom Electric Co., 27 Park Pl., New York 7, N. Y.

31. Technical Catalog No. 210 recently published gives detailed information for the specification, installation, and application of bearings for all types of screw conveyors and roller conveyors, together with operating characteristics. Engineering information covers design and operating data, standard tolerances,



clearances, press fits, and speeds and loads for live roller, belt roller, and screw conveyors. A copy will be sent upon request to Arguto Oilless Bearing Co., 107 W. Berkley Street, Philadelphia, 44, Pa.

32. "Small Cutting Tools of Extreme Precision," a new illustrated 18-page catalog, covers carbon-steel taps, prong dies, small reamers, hollow mills and centering tools, small counterborers and step drills. Interesting case histories are included. Write Woodruff & Stokes Co., Inc., Bldg. 38, 349 Lincoln St., Hingham, Mass.

33. Catalog 10-A, illustrating and describing their sheet metal fabricator, and featuring hole punching, notching and nibbling plus the patented Hydra-New-Matic head, "quick change" holder and the 3½ holder that punches round and shaped holes up to 3½" in diameter, is available from Wales-Strippit Corp., 345 Payne Ave., N. Tonawanda, N. Y.

SUPERIOR QUALITY

DIAMOND WHEELS

TWO WEEKS DELIVERY
ANY SIZE ANY SHAPE

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FARMINGTON DIAMOND TOOL CO. 28625 GRAND RIVER FARMINGTON, MICHIGAN

Phone Farmington 1598





Cost reductions up to fifty per cent claimed for Lincoln's WELDesign system

To convince the Army to buy 14 welding machines in 1917 the Lincoln Electric Company agreed to establish a welding school at its factory in Cleveland, Ohio to teach soldiers how to weld. The school is still operating and

has graduated over 35,000 welders for industry.

Today Lincoln is starting an entirely different type of training program for engineers to help industry reduce the basic cost of making machinery up to

A Lincoln field engineer explains to industrial engineers how costs can be reduced 50% and weight 30% with the WELDesign system developed and taught by Lincoln engineers in special evening courses.



What are Dies?

Production proved dies save thousands of dollars—thousands of production hours for B. Jahn customers—every day!

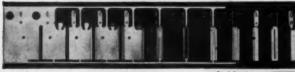
How are these tremendous savings obtained? By a few simple, honest words: This B. Jahn built die is guaranteed to run in the customer's equipment to his complete satisfaction.

n.

A simple guarantee — a simple statement of fact, but backed up by the additional promise to deliver a die strip and 10 or 50,000 PRODUCTION PROVED died parts or components for customer gauging, production use and approval.

Here is a positive method of eliminating all error, all chance, all uncertainty when you buy tools and dies.

Let B. Jahn's 165 designers, engineers and toolmakers put their 2475 years of experience to work for you. S0.000 Resor Blade Helders — being PRODUCTION PROVED in the B. John plant, Progressive die preduced 58 complete helders per minute, total run is to be millions.



Strip from 10 station progresaive die built to produce Everskarp Shick Injector Hazor Blade Holders. This strip and component purts were submitted to customer for approval.

Investigate B. Jahn and Invest in Production Economy Send for the story of 8. John PRODUCTION PROVED dies TODAY!

B. Jahn

Production Economy THE B. JAHN MANUFACTURING COMPANY - NEW BRITAIN, CONNECTICUT

50%, and reduce the weight as much as 30%. Lincoln engineers have developed new information never before available to industry which constitutes a new approach to the use of welding in the design of all types of machinery. This new information allows manufacturers of machinery to take full advantage of the superior properties of steel as a material. The Lincoln WELDesign system gives to engineers and fabricators of machinery infallible guides to deciding the type and shape of

material to use, where to place it for maximum use, and the lowest cost methods of fabrication for the final design. Check points help prevent bad designs and costly methods. Long involved calculations ordinarily required in designing are either shortened or eliminated.

The training program is being made available in principal cities throughout the country by especially trained field engineers. It is open to all qualified engineers engaged in manufacturing

machinery who are interested in reducing manufacturing costs, saving steel, and improving product performance. It is for all manufacturers regardless of whether or not welding is being currently used.

Architect's drawing of the Vascoloy-Ramet Corp. plant expansion at Waukegan, Ill. The new construction is shown in the foreground; existing plant in rear. The plant when completed will comprise the largest single construction and equipment program in the carbide industry since 1937.





Reasons for You to get the Facts on SPEEDGRIP CHUCKS

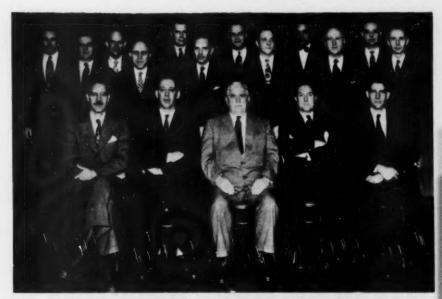
- 1. They increase production.
- 2. They give greater accuracy.
- 3. Set-up time is shorter.
- 4. They are safer to operate.
- 5. First cost is low.
- 6. Maintenance cost is low.
- 7. Design is simple.
- 8. Guaranteed to do the job.
- 9. Service is prompt.

Speedgrip Chucks will save you money on second operation work.

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SPEEDGRIP CHUCK 820 N. WARD STREET



New Junior Management Committee (standing) is welcomed into the firm of Horace T. Potts Co., Philadelphia steel warehouse and manufacturing firm. Senior partners (seated) are, left to right: Thomas I. Potts, Horace T. Potts II, Claude Mengel, Arthur L. Collins, Edward R. Potts. Junior partners, left to right: Neely, Eppinger, Riehm, Bateman, Bickel, Taylor, Reckard, Folz, Kern, Armstrong, Spencer, and Stringer.

Twelve admitted to Horace T. Potts as junior partners

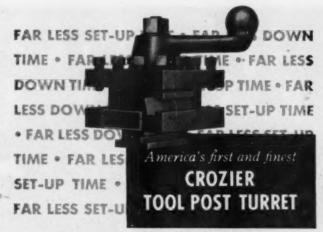
The Horace T. Potts Co., of Philadelphia announces the formation of a Junior Management Committee to guide operational policies and management of its steel warehousing and manufacturing business. It is believed to be the first time such an organizational innovation has been instituted in the steel warehousing industry.

Twelve men have been selected from various divisions of the Company to serve on the Committee. They are: Stanley L. Bateman, credit manager; Clarence R. Eppinger, York district manager; William C. Spencer, product manager; John W. Reckard, sales man-

ager; John A. Stringer, office manager; John E. Riehm, traffic manager; Ralph F. Bickel, Baltimore district manager; Robert A. Neeley, assistant purchasing agent; Donald C. Taylor, assistant to the sales manager in charge of tool steel sales; Joseph J. Folz, assistant to the sales manager in charge of stainless steel sales; David E. Armstrong, manager Speedline Division; and John H. Kern, assistant to the sales manager in charge of office sales.

Diamond association holds convention in Bermuda

Need for cooperation with the United States Government's rearmament program was the theme of the Seventh Annual Convention of the Industrial



now with 12 position indexing

12 position indexing now makes possible the alignment with work at any thirty degree increment.

This is only one of the outstanding features developed by the first and largest manufacturer of turrets for small lathes. Other features include built-in cut-off tool and holder and positive rapid indexing. All wearing parts are hardened and precision fit. They are available in three sizes.

Switch to Crozier Tool Post Turrets today. Save as much as 75% set-up and down time. Model 31, for Logan, Atlas, Craftsman, South Bend, etc. \$30.80. Write for catalog.

CROZIER MACHINE TOOL CO.

Dept. MTB-7

Hawthorne, California

Diamond Association of America at the Princess Hotel, Bermuda,

The Association is the sole representative body of the industrial diamond industry in the United States.

Besides committee and other internal affairs of the I.D.A., one aspect of the industry which was discussed at the convention was the salvaging of waste diamond. New processes for recovering this material were discussed.

The new officers: president, Harold E. Robison, Wheel Trueing Tool Co., Detroit; first vice president, Wm. F.

Mullins, Werdiger & Mullins Co., New York; second vice president, Piet Smit, J. K. Smit & Sons, Murray Hill, N. J.; and the following new directors: Walter Schwartz, Detroit; John H. Carter, Cleveland; Stephen Hofman, New York; and James A. Ross, Scranton. Athos D. Leveridge continues as secretary-treasurer and executive manager.

Speakers at the convention were M. M. Dotye, chief, Diamond Section, U.S. NPA, and Charles Morgan of the O.I.T., U.S. Dept. of Commerce.



Harold I. Smith



Harold E. Robison

Harold J. Smith was recently appointed manager of National Acme Company's Chicago District. He succeeds R. J. Preston who died May 14th after 42 years as manager.

Klingelhofer Moves

The Klingelhofer Machine Tool Co. and the Albert Klingelhofer Machine Tool Corp., formerly of Westfield, N. J., recently moved into their new head-quarters, Kenilworth Industrial Park, Kenilworth, N. J.

Open house was held recently in the spacious new building, pictured, where the most modern facilities have been installed. The plant will supply space for the storage handling and preparation of imported machine tools. A wide range of parts, accessories and blanks is stored.



Jet engines wet-blast cleaned

Only one operator is necessary to wet-blast clean the 5 foot turbine wheel and shaft assembly of the J35 turbo-jet



aircraft engine. The cleaning-done prior to assembly-is accomplished in a custom wet-blasting unit built by the Cro-Plate Co., Hartford, Conn. The unit measures 8 ft. long, 4 ft. wide and 7 ft. high, and incorporates a track-mounted dolly for loading the jet assembly into the cabinet. The assembly is rotated on centers through a variable-speed Graham transmission which permits rotation from 0 to 28 rpm. The unit is a three-station model with a sliding panel connected to both ends of the cabinet by an accordion-type rubber curtain not shown in the illustration. The operator moves to the three stations to accomplish the manual continuous wetblasting operation. Fluorescent lights and a blower to exhaust blasting vapors are built in, and air requirements are only 80 cfm at 90 psi for operation.

The internal gage that's RIGHT for war production conditions

COMTORPLUG

Gages precision bores to fractions of .0001"

War production conditions intensify the need for a gage that gives high precision yet is Rugged, Automatically Accurate, "Unrestricted". Patented COMTORPLUG answers the need as no other gage can because:

- Withstands typical shop use at machine or inspection bench, without
- Trainees equal old hands in precision results, due to automatic alignment and "feel".
- For Quality Control, gives actual measurement, and a fixed not passing—reading.
- 4) Available anywhere instantly. Weighs but a few ounces. No hose, wire, or "10-ton base".
- 5) Cost is so reasonable as to be practical for all quantity gaging appli-cations. Fits in with other gaging methods. Let it grow as it proves itself—which it WILL!



42 Farwell St., Waltham 64, Mass.

Request **Bulletin**

46"

Request data on Comtorgage Precision External Gage



1/2" to 8" dia.



Inspection to fractional ten thousandths of hydramatic airplane propeller distributor value.



Answers to Over 1000 Proc-tical Die Problems With Use of Direct Reading Tables and Formulas

ALL IN ONE COMPACT HANDBOOK . . . direct answers to die problems. Saves time. Eliminates mathematical calculations. Avoids costly errors. Contains invaluable formulas and tables for quick reference. Formulas and Direct Reading Die Tables on the following types of dies: Bending and Forming Dies, Blanking Dies, Drawing Dies, Square and Rectangular, Drawn Shells, Miscellaneous Tables and Charts.

Write for Bulletin 99-Money Back Guar-antee - Ten Days' FREE Examination.

DIE TECHNIQUES

Publishers: 5005 W. Lake St., Chicago 44, III. Please send on approval Condensed Practical Aids for Die Engineers, Designers and Die Makers.

Enclosed \$3.50 for one book ☐ Enclosed \$3.50 for one Dook ☐ Enclosed (\$3.00 each for 6 or more)

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ELECTRO MARKER

For electrical marking on soft or hardened steel, allov steels or other ferrous materials. Excellent for marking finished and ground surfaces.

> Write today for literature

H. P. Preis Engraving Machine Co. Hillside, N. J. 647 State Highway 29

Shop HINTS



Prevents breaking prongs on nuts

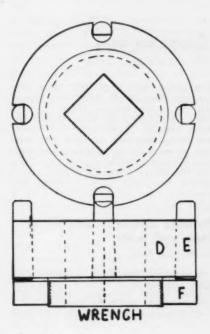
by Michael Axler

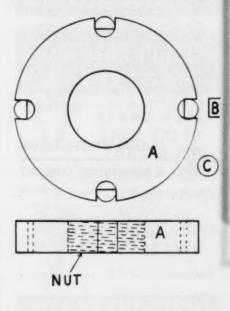
On our subway motors, on the nuts that hold the pinion on the armature shaft, there are four slots (B) ½" wide, 5/16" deep, (for tightening the nut with a wrench) and having four prongs (E). Prongs broke off when manual effort was exerted on the wrenches and the method was too slow. We tried a pneumatic wrench and really had trouble with breakage.

The new wrench I designed used the old principle but used a number nine taper pin two inches long (D) to take a taper pin number nine (E). In the back of the wrench (F) was a nut to hold the taper pins in place so that they will not work loose.

By loosening the back nut and driving the pin out, driving the new pin in, and then tightening the nut, the new unit is ready.

To convert the old nut, one has to drill the present slots in a jig to a round hole (A). We use a jig using







PAY OFF in higher production

...Because they have better anti-scoring qualities to work under extreme pressures.

Use CMD on your lathe centers, die set leader pins, steady rests, machine ways, cams, broaches, thrust bearings, taps and dies, to name a few. In fact, CMD lubricants work every day under pressures of 40,000 to 50,000 pounds per square inch in thousands of plants from coast to coast.



1906 West 46th Street Chicago 9, Illinois

Attach this coupon to your letterhead for FREE SAMPLE KIT No. 47

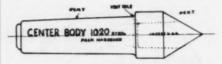
Your	Name	 	
Firm	Name		
Addr	955		

three plugs in the holes, ½" by 5/16" on the end to line up the slots. We also use an end mill instead of a drill. The price of new nuts are less, because we don't have to put the slots in the nuts, just drill them.

New centers from old by Michael Axler

Because of shortages in our shop, all our lathe centers, where made of solid high speed steel, are no different from other tools; they wear out too. From grinding the faces when worn, they eventually get too short to use. Then we send them to the blacksmith shop, to forge them. After annealing the forged pieces, we make them into centers that fit into the center body, as shown in sketch.

The center bodies are made of soft steel, pack-hardened but not quenched after being taken out of the pack hardening. The inserts are brazed into the holders. When we braze them we heat



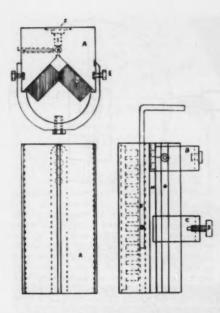
the bodies to about 1000° and then quench them in oil. After the quench, we draw the temper about 450° to 500°. The inserts are heat treated before brazing them into the center bodies. In that way we have new centers as good as the original solid high speed centers, without using or buying the whole thing. And, they are of 18-4-2 steel, not of the present war steel.

Drilling different lengths of rods and bolts

by Michael Axler

I designed and made a simple drill jig for many uses from ¼" to 2", for drilling many bolts and rods of different length and hole sizes.

This consists of a V-block (A) with



a sliding drill bushing holder (B) using interchanging bushing and sliding clamp (C) with a clamping screw (D). In the V-block base (A) are two slots (G) where holder (B) is held with bolts (E). It is moved for adjustment to the center of drill jig bushing from the end of V-block on ruler (H) that is imbedded in V-block (A). Drill bushings of different sizes are held in the bottom of V-block (I) and it is held in place with slide (J). A hole is drilled in V-block, as shown at (K), to hold a rod as a stop on rods that have no head, in turn held against the end of V-block so that rods are placed against stop. To drill holes in rods, the same distance from the center of a drilled hole-at (L) the Allen set screw is tightened. An auxiliary V-block (F) is used to hold smaller bolts and rods from 4" diameter on one side to larger sizes on the other side.

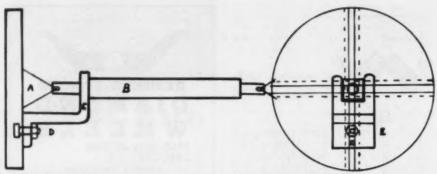


Diamond Tool Research Co., Inc. 305 East 45th St. New York 17, N.Y. Telephone Murroy Hill 4-0466



SPENDRUP, Inc. 37 Woll.St. New York 5, N. Y

Write for Catalog

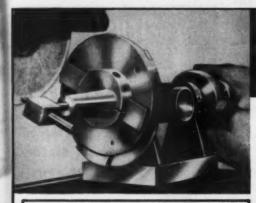


Handling heavy shafts on lathe by Michael Axier

I know of a man who was lazy; with a little ingenuity, he succeeded in producing more work than before at less cost.

He was turning shafts on a lathe and they were too heavy to handle by himself.

The shaft had to be turned on both ends—note lathe face plate left of Center A. Lathe dog C. The job or shaft B. When he finished machining one end, he had to loosen the tail stock center to turn or machine at the other end. He formed a block of wood D, to rest on the lathe ways E. In the center of the lathe under the shaft, just high enough for the shaft to rest on it, by using the block under the shaft, he had only to loosen the tail stock center and the shaft rested on the wooden block. Then he could turn it around easily himself.



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SAMSON Offset BORING CHUCKS



PRECISION WHEEL DRESSING SIMPLIFIED!

THE LAST WORD IN . . .

- Angle tangent to radius wheel dressing
- Simplicity of setting
- Shortens dressing time
- Dresses grinding wheel at point of contact
- Rugged for long life

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LAST WORD SALES CO. • 18500 Mt. Elliott • Detroit 34, Mich.

SIMPLE TOOLING CHANGES
CONVERT SET-UP TO
LATHE, MILL OF GRINDER
See New Improved

Model New Available MILL, TURN OF GRIND
with NEW COMBINATION
VIKING LMG 3

A versatile bench-type machine for small parts manufacture, combination or straight-line operation. 1"ball-bearing spindle, 825 and 3450 rpm., standard speeds (full range optional) 1/3 hp., 1725 rpm. motor.

Get Complete Information in Our New Bulletin No. 300.

VIKING INDUSTRIES

220 MONTAGUE STREET . ROCKFORD, ILLINOIS



Portable — move directly to job; a time saver for both small and large shops. 3¾" stroke; adaptable for other

work.
Low first cost—
prompt delivery.
Good dealers wanted.

Reading Machine Co. Cincinneti 37, Ohio







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SPIRAL GEARS
WORM
BEVEL
GENERATED WITH
GENERATED WITH
MODERN EQUIPMENT

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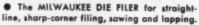


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INDRICAL SUB-PRESSES Dies for high precision work should not only be perfectly aligned but provision should be made to maintain that alignment throughout the life of the die. Our bulletin shows how it can be done.

WALTHAM MACHINE WORKS WALTHAM 54. MASS.



ARCH SUB-PRESS

MODERN TOOLS

Switch housing studs processed two-at-a-time for increased production

STAKING two specially treated, cold rolled steel latch studs simultaneously into a snap-socket switch housing, used in electrical component parts, is now being done at the Cleveland plant of the National Acme Co. on a new oil-hydraulic press setup. The studs are specially treated because they are used on the water as well as on land, making the prevention of rust and corrosion an important factor.

This installation, an 8-ton Multipress equipped with six-station index table,

eliminates the former method of putting the studs in by hammer and drift or punch, which was quite slow and exceptionally liable to error. Now this new setup turns out 720 complete units per hour, or one completed part every five seconds. This is an outstanding increase over the previous method. In fact, production speed is limited only by the rate at which the operator can load the fixtures, since the speed of the index table can be regulated to fix the operator's working pace.

General view of the Multipress which stakes two steel latch stude into a snap-socket switch housing. The machine is equipped with a six-station index table. The new set-up turns out 720 complete units per hour. The complete production rate is limited only by the speed with which the operator is able to load the fixture. The machine has several safety features built into it which eliminate the dangers of operator injuries.



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Model WD-10 Wet er Dry 10" Carbide Tool Grinder.

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This sturdily constructed bench drilling machine is available in 1, 2, 3 and 4 spindle models . . . speeds from 4,000 to 10,000 r.p.m.

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Sale Sales Agents

PRATT & WILLIAM Division Niles - Bement - Pond Co.
West Hartford, Cannecticut

At each of the six stations on the index table is a holding fixture, conforming in design to the inside of the switch housing, having a recess in which the operator sets the two studs. With the studs in position for processing, the operator simply places the switch housings on the fixtures. The remainder of the operation is automatic. The index table automatically moves the parts under the press ram to be processed.

The tooling on this particular press

consists of a double punch with a back plate to prevent the punches from backing up in the head. The punch ends are rounded off to spread the rivet for a strong, complete set.

The striking force that fixes the studs in place sometimes causes the housing to become locked on the holding fixture. But this problem was overcome by means of a solenoid-operated knockout at the station just beyond the press ram station. The knockout is operated from the dial limit switch set on the

300% FASTER

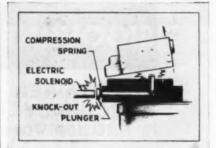
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For example you can drill multi-diameter holes and countersink or chamfer in one operation. Each tool is made special for the job to be done. Shown below are just a few of the special cutting tools which we make. Hundreds of other combinations to save you money. Write for Bulletin No. 102.

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The solenoid-operated knockout at the station just beyond the press ram station which prevents the housing from becoming locked due to the striking force that fixes the studs in place. The knockout is operated from a dial limit switch set on the side of the index table.

side of the index table. This switch operates a Nemco solenoid as it strikes a dimple on the table. This action closes the contact, causing the solenoid to eject forward; then the part is

MOSLO "SHIFTWEIGHT" COUNTER-BALANCED WIRE REELS

Takes the Manual Labor out of loading a Reel with Wire. Just unlock the knurled spindle by a twist of the wrist, tilt the reel assembly 90°, roll coil of wire to reel, lift 6" on to centering arms, release lock by twist of wrist, use spindle as lever to lift, and the Weighted Counterbalance does the rest!

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Here's a versatile, handy, accurate surface grinder. Just a few of the usea are: Chip breaker, grinding and sharpening carbide tools, sharpening straight and circular screw machine form tools, also circular file chisels, thread chaser and form surface grinder. Prompt Delivery!

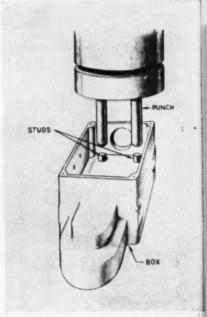
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J. B. CROSSMAN & SON, INC. EAST WALPOLE, MASS.



ejected straight up and out. The ram bottoming action is stopped by a depth micrometer set on the side of the press. The Nemco solenoid used in this operation is one instance where a manufacturing company is able to make use

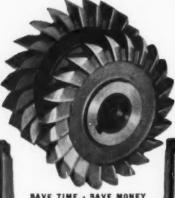
The tooling on this particular press consists of a double punch with a back plate to prevent the punches from backing up in the head. The punch ends are rounded off to spread the rivet for a strong, complete set.





Springfield, Ohio





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of its own product, since this solenoid is a product of National Acme.

The index table, in addition to being an important factor in stepping up production and producing a unit with a higher degree of accuracy and straightness, also acts as a safety feature. Since the fixtures are loaded at a position away from the area of the moving ram, the danger of crushed fingers is eliminated. This has played an important part in raising employee morale.

Because of its wide versatility and variety of standard controls and components, this Multipress is also used on several other jobs at National Acme. One of these is the moulding of small silver contacts forming a part of the manufacturer's equipment. However, on this operation, air-blast ejection of the finished part has been added to the process.

The End

Tilt top truck solves positioning problem

Because, in one case, 2000 lb. broach holders could be handled only by crane, and because the crane could deliver the broach holder in only one manner, a means was required for positioning the broach holder for certain maintenance operations. This Portelvator tilting top truck was constructed to meet the need.



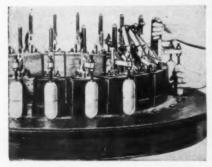
The table top, 24" x 96", rotates 360° on a horizontal axis and can be locked in place wherever stopped. Back plate supports broach holders and fixtures as table tilts work to convenient posi-

tion for service. Table service is 30" from floor. Truck rides on two wheels and four casters for easy maneuverability in restricted space. Floor locks at each end prevent unwanted movement. Capacity is 3000 lbs.

This Portelvator tilting top truck was built by The Hamilton Tool Co., Hamilton, Ohio.

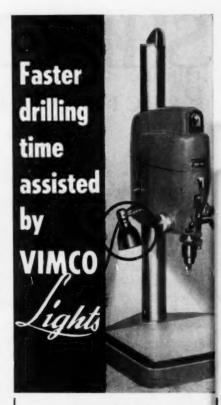
Toggle clamps speed production of fish net floats

The use of toggle clamps help speed production in the manufacture of plastic fish net floats, at Dale Plastics Corp., Detroit, Mich. In the manufacture of the floats, 24 toggle clamps are fastened on a turntable fixture. An operator applies cement to the two halves of the float and inserts the center piece. The float is then clamped onto the fixture. This procedure is repeated until twenty-four floats are clamped. Approximately



Toggle clamps used to manufacture fish net floats. About 240 to 300 floats are produced per hour.

6 minutes elapse between the time the first float is cemented and removed from the fixture. Two fixtures are used by each operator during the clamping and cementing application, producing 240 to 300 floats per hour. Clamps are De-Sta-Co toggle clamps manufactured by the Detroit Stamping Co., Detroit, Mich.



Electro-Mechano has installed Vimcolights as original equipment on their versatile 18" Drilling Machine to help eliminate worker errors. Other manufacturers are using nonglare Vimcolights to safeguard the production efficiency of their machines. With Vimcolights you can be sure of peak performance regardless of local lighting. Assured accuracy. Faster production. Less waste. Write for Bulletin 74 . . . see the many Vimcolight applications.

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TAPER ROLLER BEARINGS

No lathe can be more accurate than its spindle bearings. Hence before buying any lathe one should check the *exact* type and tolerances of bearings used.

The No. TS-56B (and several other) SHELDON Precision Lathes have Timken "Zero Precision" Taper Roller Bearings, held to tolerances of .00015". Not only are these the most accurate bearings used in any lathe, they are the sturdiest type . . . hold their accuracy thru long hard use . . . hold it even under abuse. With the other stamina features built into SHELDON Precision Lathes, they assure continued accuracy, without costly maintenance, thru years of hard service.

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IN

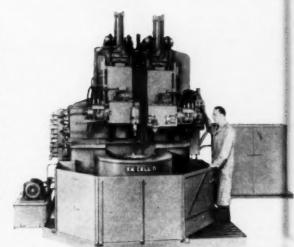
METALWORKING

Vertical precision boring machine

The Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich., has developed an automatic vertical precision boring machine, style 425. It is massive and heavy, for multiple precision boring, turning, and facing operations, and it's rugged enough for semifinishing work. Operations can be performed in a choice of versatile automatic cycles which include automatic changes in work spindle speeds.

The heavy cast-iron base supports a column on which two vertical slides are mounted. These slides are fully counterweighted and

operated by large hydraulic cylinders for smooth performance. Each vertical slide carries a cross slide also powered by large hydraulic cylinders. All slide



This vertical precision boring machine, being made by The Ex-Cell-O Corp., is heavy enough for multiple precision boring, turning and facing or semi-finishing work. A dominant feature is its versatility.

ways are hardened and precision ground.

Large parts are easily loaded on the 36-inch diameter table, which is sup-

The SAFE and SURE **May Speed Chuck**

No rotating parts in operator's hand

See how easy-and safe-it is to change drills in the MAY SPEED CHUCK While spindle is running? That's because the adapter - not the operator-holds the

drill.

Operator just grips knurled collar (which does not rotate) on the adapter ...lifts sleeve with his thumb releasing adapter . . . inserts next adapter containing drill, with similar motion to make tool change all in a few seconds. Drill can be removed from adapter without conventional drift and hammer.



Cheapest in the long run... Cheapest for those short runs

The MAY SPEED CHUCK is designed for extremely precise work, beyond the limits of ordinary chucks. It pays its own way In consistent accuracy without end play, reduces tool breakage and work spoilage. And its safety factor is cheap insurance. Write for complete details.

Available with No. 2 or No. 3 Mor

205 East 42nd Street, New York 17 4220 Prospect Avenue, Cleveland 3 19450 James Couzens Highway, Detroit 35 Canadian sales by European Machinery Ltd., 11 King St. West, Terente, Canada

ported on a vertical spindle. This spindle is mounted in 24-inch taper roller bearings, and driven through a precision worm at a range of speeds up to 500 r.p.m. This range includes speeds high enough to machine aluminum efficiently.

The dominant feature of the Style 425 is its versatility. It is now being applied to multiple finishing operations on large wheels for jet aircraft engine compressors. Operations include precision boring, counterboring, chamfering, feed-facing and rabbeting.

Automatic functions of this new standard machine include all slide movements, work speed control, lubrication and coolant control.

Automatic machine grinds complete jet blade airfoils

Pratt & Whitney, Div. Niles-Bement-Pond Company, West Hartford 1, Conn. has developed an automatic grinder for finish sizing irregular and twisted airfoil sections of jet engine compressor blades and turbine buckets. The machine has been designated the Turbine Blade Airfoil Grinder. The complete airfoil section-including the important leading and trailing edges, and the area close to angular roots or shrouds-is ground in a single automatic cycle. One operator, attending a battery of machines, has only to unload the finished blade, load a forged or fabricated blade blank and restart the cycle. A high rate of production held to close and consistently uniform tolerances at a low cost per blade, is claimed.

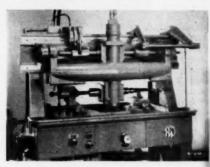
The machine operates on the duplicating principle, copying from an airfoil master. The master is an exact duplicate of the blade shape desired, except a uniform envelope of material is added to stiffen it against deflection. Stock is removed from the work by a high-speed coated abrasive belt. The belt runs over a small grinding contact wheel. The use of abrasive belts for precision grinding eliminates the complicated problem of maintaining proper grinding wheel and tracer wheel size relationship, and in addition, provides a large grinding surface despite the necessary small diameter contact wheels needed to grind the concave surface of the airfoil. Also, dressing and truing operations are not required.

The unit is composed of a main frame, at the top of which a pivoting work frame is suspended from a traversing carriage. A center horizontal beam carries a fixed master follower roll and the grinding belt unit. As the work and master rotate simultaneously, the master, resting against the follower roll, moves the work frame in and out and causes the grinding contact wheel to duplicate the shape in the work.

The rate of rotation is automatically varied during each rotation to cause the leading and trailing edges of the blade to pass the grinding contact faster than the concave and convex surfaces. To keep the grinding contact presented normal to the twisted foil at all times, the grinding belt wheel is swivelled by cam action. As the workpiece rotates it is traversed lengthwise across the grinding contact. A com-

pound motion is added at the end of the traverse pass when grinding blades with angular roots or shrouds.

A roughing pass removes from .002"



to .006" on a side per traverse; a finishing pass .001" per side. A rough milled blade blank with a maximum envelope of .010" is ordinarily finished in four traverses.

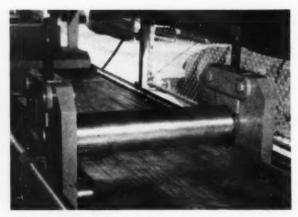


Stretch-flattening machine

The Longren Aircraft Co., 2576 W. Carson St., Torrance, Calif., announced recently the completion of a stretch-flattening machine that can process in volume integrally stiffened extruded sections with flatness tolerances well within the precision requirements of present-day aircraft design.

Ever since the advent of high-speed, highly stressed air-planes, demanding in turn thinner wings and stronger external fuselage sections, each with optimum nerodynamic surfaces, aircraft design engineers have been appraising the possibility of using integrally stiffened skin structures to offset structural complexity, reduce weight and volume requirements, and dd strength. To date, Integrally stiffened skin ections have been machined from flat billet tock to prove their feasibility, but costs and material wastes using this method were prohibitive. A few experimental sections were produced by forging, easting, and rolling, but such methods have left much to be desired in the way of practical results.

It was obvious from the first that extruding such sections would be the cheapest and fastest method of production, and would eliminate material waste to a great degree. But because of the necessary and ex-

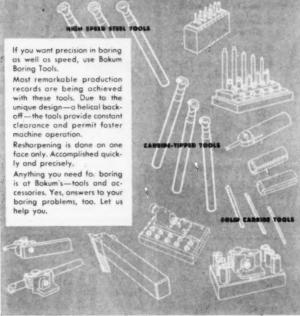


Roll stretch flattening in action. In flattening, the heat treated, integrally stiffened sections are end-mounted between mechanical v-clamps in the tension flattening machine. One of the v-clamps remains fixed while the other is mounted on a hydraulic piston. Using hydraulic pressure, the entire sheet is then placed under tension to a point just below the yield strength of the material.



After heat treat before rolling and stretch. This shows a finished sheet after initial tensioning in the above operation, after the traveling carriage, with its three rigidly mounted displacement rolls is started along the sheet from the stationary jaw end. The movable chuck automatically takes up the slack of elongation and maintains even tension.





INGLE POINT ROVING 10015 - INTERNAL THREADING, SOTTOMING AND FACING 10015 - EASIST TIPPES 10015 DEPT. H • 14775 WILDEMERE AVE. • DETROIT 21, MICH.

pensive machining due to the metallurgical principles involved and to the peculiarities of the extrusion process, it was necessary to extrude the sections in tubular form with the integral stiffeners radiating from the outside periphery of the tube. These tubular sections would then have to be split and flattened into sheet form.

Final flattening of the extruded, split, and heat-treated section, became the critical problem. Many techniques using available equipment were tried and found wanting. Longren engineers, encouraged by many large airframe companies, and with more than 20 years of experience in stretch forming of aluminum to back them up, tackled this extrusion flattening problem early in 1949.

When the aluminum alloy integrally stiffened extruded tubular sections are





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Vise No.	Width of Jaw. Inches	Opens Inches	Weight Pounds
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HURON

Dearborn, Mich.

received in the Longren shops, they are first split longitudinally, roughly flattened, then heat treated.

In flattening, the heat treated, integrally stiffened sections are end-mounted between mechanical v-clamps in the tension flattening machine. One of the v-clamps remains fixed while the other is mounted on a hydraulic piston. Using hydraulic pressure, the entire sheet is then placed under tension to a point just below the yield strength of the material.

After this initial tensioning, the traveling carriage with its three rigidly mounted displacement rolls is started along the sheet from the stationary jaw end. The movable chuck automatically takes up the slack of elongation and maintains even tension. The lower rolls of the carriage are sectional in design so that the tops of the extruded stiffeners rest' firmly against an inner roll, while the outer rolls press firmly against the sheet area between the stiffeners. The upper roll is solid and smooth, and presses against what will be the external side of the flattened section.

As the traveling carriage progresses along the sheet, the material feeds over the first lower roll, then angles slightly downward under the upper center roll. Beyond the upper center roll, it angles upward again, then reverts to the plane of tension between the end clamping jaws after leaving the last displacement roll.

Just as the material passes under the center roll, the greatest elongation takes place. At this point, the material is tensioned slightly beyond its yield point, and work hardening takes place. On passing the last displacement roll, the material stabilizes to a permanently flattened condition.

To further assure this passive condition, the angles of displacement through the rolls are carefully balanced out, thus assuring equal stress relief in both the sheet and the extruded stiffeners. After the sheets have been flat-

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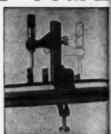
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BARTELT ENGINEERING CO. 1218 Portridge Ave.

Beloit Wisconsin

tened to permissible tolerances, they can be contoured as desired using conventional stretch press equipment.

Filter extends coolant efficiency

Cutting coolant filtration costs up to 75% with the Houdaille Web-o-matic, self-cleaning web-type filter for individual machine tools or small central coolant systems, is claimed by the Honan-Crane Corp., 911 Sixth St., Lebanon, Ind. Two models—the ramp



discharge type, for applications requiring above-floor installation—and the bottom discharge type, for applications requiring bottom discharge below floor level, are offered. Web-o-matic's engineering features eliminate frequent, costly filter changes, extend coolant life indefinitely, protect expensive equipment, help to increase production and improve product finishes. Both models were developed especially for all machine tool operations wherever mineral or soluble oil coolants are used.

DiJulio company not making angle generator

In the May issue of MACHINE AND TOOL BLUE BOOK it was intimated that the angle generator invented by Edgar M. Bull and Carl John DiJulio was being manufactured by Charles DiJulio and Son, builders and contractors, Baltimore, 4, Md. The Charles DiJulio Construction Co. is merely the business associate of the inventors and is not prepared to manufacture it.

It is suggested that those wanting more information on this unit write either Edgar M. Bull or Carl John DiJulio, 104 LaPaix Lane, Baltimore 4, Md., direct.



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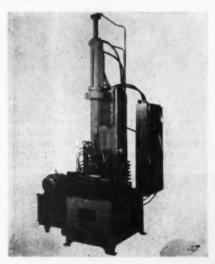
threads for a quicker, easier fit. They save money, too, because fewer screws and a faster fit means LOWER COSTS all down the line. Call the INDUSTRIAL SUPPLY DISTRIB-

UTOR nearest you today. Ask him for Chicago and get "Safety Plus".

Chicago SCREW COMPANY
2507 WASHINGTON BLVD.
BELLWOOD, ILL.

D-12 honing machine added by Staple Co.

The Model D-12 vertical honing machine has recently been added to the line of honing machines manufactured by the Staple Engineering Co., Inc., 1315 S. Woodward Ave., Birmingham, Mich.

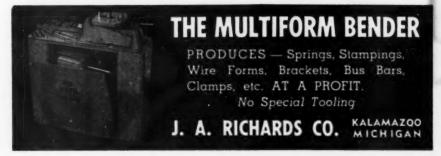


It has a range of 1¼ to 4" diameter and the 10" stroke is electrically controlled, hydraulically operated.

The spindle drive is by spiral gears and vee belts, with pick off sheeves for speed change. A three h.p. motor (1200 or 1800) is standard for the spindle drive. Hydraulic pressure for

reciprocating the spindle and for stone feed out is supplied by a separate unit driven by a two h.p. motor. Hydraulic oil capacity is 30 gallons. Honing stones are actuated by hydraulic pressure and are held out to a pre-set size during the stroke out period. This stroke out time may be adjusted from three to 120 seconds. Spindle stroking is adjustable from 10 feet per minute to 50 feet per minute.



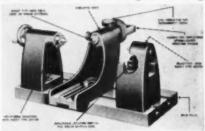


Red Ring stock divider for gears

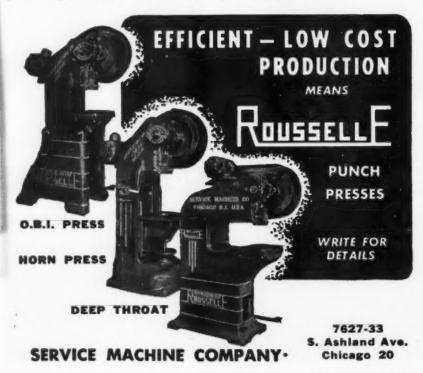
A stock divider announced by The National Broach and Machine Co., 5600 St. Jean Ave., Detroit 13, Mich., eliminates determining eccentricity or locating high point on the pitch circle by allowing a gear grinding operator to clamp each gear on its arbor while its predecessor is being ground. Thus, the only down time is that required to unload the finished gear and immediately load the next.

The stock divider, usually located on a bench in the vicinity of the grinder, consists of movable head and tailstocks and a checking head adjustable to work gear diameter. The latter has a removable nose piece and a spring-loaded spindle which actuates a dial indicator for reading gear eccentricity. This spindle may be locked with the nose piece either in or out of contact with the work gear teeth.

The arbor carrying the work gear is set between the stock divider centers and the arbor driving dog in contact with the adjustable locating button. In most cases the work gear rotating



on its arbor is then checked for eccentricity at several points around its circumference by means of the nose piece and dial indicator.



Light weight air power riveter

An air-power riveter, fast in operation and light in weight has been announced by the Barrett Equipment Co., 21st & Cass, St. Louis, 6, Mo. Especially useful in numberless types of assembly operations in the metalworking, woodworking and plastics industries, the air-power riveter can be used for riveting, de-riveting, punching, forming and stamping merely by changing tools.

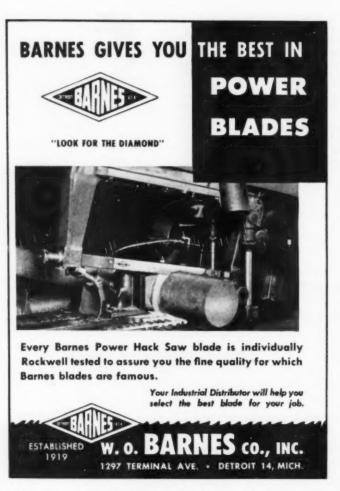
Although designed for bench installation, it can be installed on either a base or stand for conveniently handling any specific job. One simple air line connection is all that is required. A standard type of foot control is furnished, but either a hand control or automatic control may be used.

An accurate regulator and gauge, for controlling operating air pressures up to recommended 125 pounds regardless of air line pressure, can be furnished.

The riveter is 16 inches high overall, bolts quickly to any work bench, weighs 37 pounds, and is designed with a throat







clearance of 3½ inches. An air line pressure of 100 pounds p.s.i. produces a working pressure of 1100 pounds with an 11/16 inch stroke.

Clausing name held by purchaser of lathe firm

The Atlas Press Co., 2350 N. Pitcher St., Kalamazoo, Mich., recently purchased the Clausing Mfg. Co., Ottumwa, Iowa, producers of heavy-duty 12-inch precision lathes. The Clausing name

has been retained, and several refinements of design and construction have been incorporated in the two series of lathes now being manufactured.

The 6300 series Clausing lathe illustrated, features a forged, ground steel spindle, with 1" collet capacity, a.s.a.—L-00 tapered key drive nose, and Timken tapered roller bearing equipped spindle and lead screw. An outboard drive has dual A-belts driving the spindle pulley. There's a choice of countershaft or variable speed drive. It has a

On cut-off jobs ... This is the saw that SAVES TIME ... MONEY ... MANPOWER



Whether it's for production, general utility or both, the Wells No. 8 is an investment that will pay for itself many times over in savings of time, money and manpower. These savings can mean a lot in any shop . . . why not find out what they can mean to you. The Wells No. 8 has a capacity 8" x 16", rectangular, 8" diam., rounds. It is powered by a heavy duty ½ H.P. motor. Other sizes also available. See your Wells Dealer for further information or write for literature.



Products by Wells are Practical

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION 707 COOLIDGE AVE., THREE RIVERS, MICH.

wide, thick bed with two V-ways and two flat ways precision ground. Headstock, quick change gear box and apron are enclosed—all have splash lubrication.

The 4800 series Clausing has a Timken tapered roller bearing equipped spindle, threaded, with 1/2" collet capacity. The automatic apron is double-walled—gears and shafts are splash lubricated.

Built-in countershaft has frictionclutch and brake. Quick change gear shafts turn on ball bearings. The motor mount is integral. The two V-ways and two flat ways of the heavy bed are precision ground.

Specifications are: 24", 36" and 48" between centers; 12 3/4" swing over bed, 7 1/2" over saddle; thread range 48—4 to 224 Standard, right or left.

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Set hand or press markings quickly, easily to meet each day's changing needs. Parker Type Holders and Steel Type Sets assure new flexibility, making any required stamp available in seconds. Part numbers, dating, inspection numbers—a press or hand marking stamp for any material, any job is always at your fingertips. Number, and number and letter sets are scientifically compiled to permit the widest versatility, largest number of words. Threaded shank is furnished to allow hand stamp to be made into press stamp in an instant. Each set is crafted with traditional Parker skill to guarantee years of clean, permanent stamping—the convenience and utility of many dies in one economical unit.

Write TODAY for literature and prices on the many dollar saving Parker type sets available.



38-spindle screw tapper with safety tap holders

The United States Drill Head Co., Cincinnati, 4, O., has recently designed and built this special tapping head to operate in conjunction with two additional lead screw tapping heads on a three way machine.

Individual lead screw tapping heads can tap holes regardless of different threads, fine or course, small or large diameters, in the same head as each tap has its own lead screw, the lead of which is identical with the tap.

This particular head is said to have performed the tapping of 5/16"-18, 3/8" -16, 1/8"-27 taper pipe, 3/8"-18 taper pipe, and 3/4"-14 taper pipe holes in aluminum. In tapping an accessory case, a class 3 thread was required. The %"-14 taper pipe taps operated at 90 surface feet per minute. The maximum stroke of the spindle varied with require-

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6x 6x12"	\$ 467.00	\$ 548.00
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quirements of each hole to be tapped. The maximum stroke was 3-1/8". By means of a rotary gear type limit switch the stroke was reduced to a minimum working stroke in order to obtain a minimum time cycle. The time cycle of the head was 8 seconds. This time, plus the loading and unloading time, would result in an estimated production, at 80% efficiency, of 97 pieces per

hour. Each spindle of the head was furnished with the U. S. Drill Head patented safety tap holder. With this type holder there was eliminated tap breakage due either to the tap bottoming or striking a solid surface where a hole was not drilled. In such cases the tap holder becomes stationary while the main portion of the spindle and lead screw continue to rotate and

CLOSED

TRADE <



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Offset Type

Plain Type

CONTINUOUS HINGES

All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.

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AUTO MOULDING & MFG. CO. 1110 E. 87TH ST. CHICAGO 19, ILL. SPECIFICATIONS: Open width %" to 6" Gage Material .040 to .125 Pin Diameter .101 to % Lengths to 120"

SEMI-OFFSET

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SPECIAL CUTTING TOOLS

SPEIT DRILL BUSHINGS

CROSS SLICE KHURL HOLDERS

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Made in Two Sizes to Fit Your Requirements: Model A...1" (max. capacity 1-1/16") Model B...2" (max. capacity 2-1/16")

Model B...2" (max. capacity 2-1/16")
Round, square or hexagon collets, plain or serrated

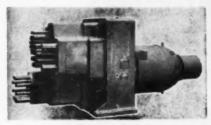
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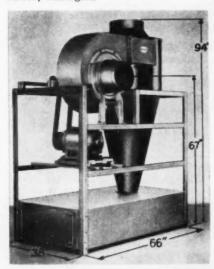
advance. When the lead screw is reversed, the tap holder automatically returns to its original position. This



automatic feature removes a burden from the operator as the tap is always in the proper position for the next work piece.

Big capacity dust collector requires small floor space

A self-contained, unit type dust collector for use in industrial dust control requiring 5,500 cubic feet of air per minute has been added to the line of Aget-Detroit Co., 205 Main Street, Ann Arbor, Michigan,



While developing a rated 5,500 c.f.m. at 4" of water on a 12" inlet, which would ordinarily place it in the custom-

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Interchangeable Holders, Cutters and Pilots . quality-built tools for trouble-free Counterboring, Countersinking, Spotfacing

They Are Available from Stock in the three types shown below . . . High-speed cutters in sizes 14" to 3" diameter with five flutes . . . and up to 114" in threeflute form; quick delivery of larger sizes up to 5° diameter. Holders are stocked with Morse taper and straight shanks.

Counterbore Sets contain assortments of the most active sizes of holders, cutters and pilots, each set in a hardwood box, to meet a wide variety of needs.

Heavy-Duty Type C has tapered cutter shank for perfect alignment, hexagon head for drive. Type C Holders not only take high-speed counterbores and countersinks, but also a line of tungsten-carbide tipped 3-flute counterbores, stocked %" to 21/2" diameter.

Special Cutters of all kinds are successfully operated in Type C Standard Holders . . . both high-speed and tungsten-carbide tipped . . . one-piece and replaceable-blade . . . designed for multi-diameter boring, chamfering, facing and forming.

The GAIRING TOOL COMPANY

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built class, the collector is available from stock as a complete unit with motor driven fan, cyclone separator, and dust storage compartment.

A feature of the unit (Dustkop Model 50N60) is the extremely small floor space requirements, 38"x66". The overall height to the top of the sleeve is 94". Both inlet and outlet sleeve, 12" and 16" respectively, are sized to fit standard sheet metal pipe. Installation can be made without special parts.

This unit is recommended for almost any type of industrial dust including those dusts, lint and chips generated in grinding, polishing, buffing, turning, milling operations; dust control in the woodworking and in the chemical and foodstuffs field is also in its range. It is especially recommended for installations where dust containing toxic elements must be discharged out-ofdoors.

The collector is equipped with a 10



h.p. continuous duty motor which drives the paddle wheel, self-clearing fan through a series of v-belts. Starter switch is included and is mounted on the frame.

Die cushion lubricant

The Dayton Rogers Mfg. Co., Minneapolis 7, Minn., has recently put on the market a specially compounded lubricant for pneumatic die cushions.

It was found that a considerable

amount of excessive wear, particularly on the packings, can be reduced to a minimum by the correct die cushion lubricant.

This specially compounded lubricant assures maximum life to the cup packings on the die cushion cylinders, and the proper lubrication through the cylinder and piston, including other working parts.

It is now available from stock in 10 lb. and 35 lb. pails.



Thread-cutting screw for molding into rubber or plastic

A specially designed shakeproof Type 25 thread-cutting screw made by Shakeproof Inc., St. Charles Road, Elgin, Ill., features a combination pancake-hexagon head ideal for molding into rubber. In application, rubber is molded around the special screw head; the enlarged pancake surface provides holding power and the hexagon feature prevents the screw from turning.

Outstanding current application for this new screw is its inclusion in rubber suction cups. After molding, the cups are fastened by the screw to plastic tray bottoms, dishes, etc.

Pneumatic angle-head drill

The especially small, compact anglehead made by Mall Tool Co., 7740 So. Chicago Ave., Chicago 19, Ill., permits drilling in unusually close quarters. The angle head can be swiveled to any

NEW IMPROVED HAND SCRAPERS

with just the correct spring

and other features
never before incorporated
in any hand scraper



This new Hand Scraper, Model No. 5, is the most improved tool of its kind ever produced. Light in weight, easier to use with palm fitting comfort grip, faster cutting.

Rubber handle swivel pad, at small

extra cost, for those who place scraper handle against body for extra leverage. Three sizes: 18"—20"—22" long. Furnished with high speed steel or Carboloy Blades. Cost less than home made scrapers.



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Special Cylinder Designers



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position relative to the throttle by simply loosening a single nut.

Inside the slim aluminum alloy hous-

ing of this light-weight Mall ½" pneumatic angle drill is a powerful air motor, producing exceptionally high power in relation to air consumption, as well as efficient operation at low pressure. A built-in regulator allows for variable speed ranges, while proper lubrication results from a built-in automatic oiler that eliminates the need for line oiling.

Center finder lights up when point is located

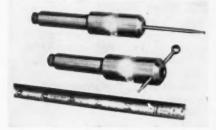
A battery-operated center finder that lights up when the point desired is located, is being manufactured by Art-Mil Machine & Mfg., Inc., 170 Hosack St., Columbus, Ohio.

Designed for use with milling machines, lathes, jig borers and drill presses where precision work is essential, the new Art-Mil center finder or light wiggler, provides accuracy to within .0001 when used to locate working points or in slot and hole centering.

A small, compact device for the tool box or the tool room, the Art-Mil light



wiggler operates on a standard one-cell battery similar to those used in flashlights attached to key chains. The manufacturer reports this new center finder can be used to center and locate bores, for truing deep holes, locating spindle centers, and to set recesses inside bores. In each instance, when it



makes contact with the work piece, it automatically lights up to eliminate guesswork and lessen eye strain. The Art-Mil light wiggler can be used as a comparator on a surface gage when equipped with a special holder, can be used to pick up dimensions by contact with height gage without use of feelers, and can be used as a warning stop where close tolerance is necessary.

Tests prove rust inhibitor

Recent tests, according to The Crown Industrial Products Co., Park and Borden Ave., Sycamore, Ill., have proven their latest rust inhibitor is effective for six months to over a year, depending on humidity and other similar conditions. For comparative purposes, it withstood 72 hours in the standard salt spray test.

The Crown rust inhibitor is offered in a handy 12 oz. spray container, or bulk. Not a plastic, it is an animal fat base product that has lubrication qualities. When applied to precision or friction parts, there will be no clogging or gumming so there is no reason to remove it except under extremely close tolerance conditions. When desired, the product can be easily removed with kerosene or gasoline. Non-toxic and non-inflammable, it can be applied to a wet surface and still be effective.





KLAAS MACHINE & MFG. COMPANY

4346 EAST 49th STREET . CLEVELAND 25, OHIO

UNUSUAL AIDS

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Variable speed pulley gives wide speed choice

The HI-LO, a variable speed pulley manufactured by Equipment Engineering Co., 2851 Columbus, Minneapolis, Minn., gives infinite speed variations with constant speed motors and any make of standard V-belt. They maintain constant speed at any speed setting no matter how the load or belt tension varies, the manufacturer claims.

At any speed setting V-belts used in connection with the pulley are under no greater tension than is actually required by the actual load which is carried by the positive contact between the cam and cam track, an exclusive feature. At no time does the belt have to carry an additional load from excessive spring pressure against the pulley faces. To obtain greater speed ranges than are possible with a single pulley, two of the same size can be used. The range obtainable would then be the square of the ratio of a single pulley. For instance, two having a ratio of 2:1 each, would give a total range of 4:1.

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STOCK FEWER SPARES

WITH NICHOLOSON VALVES

Because Nicholson control valves are suitable for all mediums, they offer maximum use for interchange and replacement purposes. Unlike many poppet or balanced-piston valves, they can be used for steam as well as air, gas, oil or water. A prominent rubber firm reports that they carry only one spare valve for each 52 in service. Also CATALOG a larger choice of metal combinations. 552

Lever, foot, solenoid, motor types; size

1/4" to 21/2"; pressures to 5,000 lbs. 117 Oregon Si

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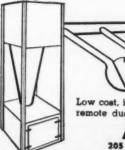
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TRAPS · VALVES · FLOATS

STOP DUST

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Low cost, immediate control of dust from one remote dust source, or from a whole shop!

300 cfm to 10,000 cfm per unit (22 models) standard, pre-tested, available from stock. Ask for catalog 605-2. No obligation.

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- Note depth of bearing.
 Tool carrying block most accurately fitted of any boring head made.
- Large graduated dial screw — easily read callbrations.
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 Nine sizes.
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No. 4

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- Fully hardened Chrom-Moly Steel Gears, Spindles and Drives
- Built to Precision Standards Dependable Delivery Promises

Adjustable Drillheads of Standard Universal Joint and Gear Driven Eccentric Type Automatic Reverse Tap-or-Drill Units

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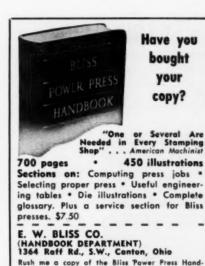
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at the extremely low first cost and the vitally important lobs that this little precision machine can do. It will pay you to get our accuracy information on this machine which has 6"x10" table movement and 7'x 17½" table size.

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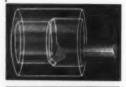
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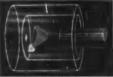
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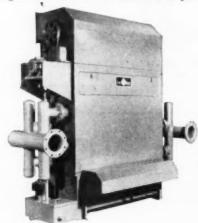
R. B. TOOL CO., INC.

41 East Hartsdale Ave., Hartsdale, N. Y.

Improve design of Niagara Aero After Cooler

The Niagara Blower Co., 405 Lexington Ave., New York 17, N. Y., announces a new improved design of the Niagara Aero After Cooler, for compressed air or gasses, in which the cooling capacity of the units is increased from 25% to 75% over previous models.

Cooling is done by the evaporation of re-circulating water sprays on the surface of tubes thru which the compressed air passes. The increased capacity in the new models is gained by improved distribution of the compressed air in the machine and an increase in the amount of evaporating surface. Tube sizes have been increased to reduce friction. The equipment is designed for installation outdoors to pro-



vide cleaner compressed air and save space in industrial buildings. Freezing is prevented in winter by automatic control which shuts off freezing cold air from the spray chamber.

The cooling medium is air at the atmospheric wet bulb temperature which is cooler than the average summer temperature of surface cooling water. The Niagara Aero After Cooler, therefore, removes more moisture from compressed air than after coolers using surface water. Also, since the compressed air is always cooled below the atmospheric dry bulb temperature, it prevents condensation in compressed

air lines, and damage to pneumatic tools, paint sprays and plant processes.

The Aero After Cooler consumes less than 5% of the cooling water required by conventional after coolers.

A.C. clamp type hand instrument measures amperes and volts

The Columbia Type AC-1 Volt-Ammeter is a clamp-type, hand-sized measuring instrument that does two separate jobs—measures volts and amperes—instantly and accurately. This new instrument has just been announced by Columbia Electric Mfg. Co., Dept. BB, 4553 Hamilton Ave., Cleveland 14, Ohio, to supplement its line of tong test ammeters.

Readings are made without breaking circuit or insulation. To read ampères



the convenient trigger is pressed, opening the pair of insulated jaws so that they can be easily encircled around the power cable or bus bar. The jaws will accommodate cables up to 1½" in diameter and bus bars up to 2" x ½". Four amperage ranges are available: 0-12, 0-60, 0-120, 0-600 A.C. amperes.

Voltage leads are quickly and safely plugged into the handle of the instrument. Two voltage ranges are available, 0-150 and 0-600 A.C. volts. Small enough to insert in a pocket, the instrument is easily held and operated with one hand. It weighs less than two pounds. Over-all dimensions are 11" x 3½" x 1%".



BOSTON UNIVERSAL ANGLE PLATE

Precision Tool that Holds Work at Any Desired Angle. Horizontal motion is 360 degrees; ver-

Puts Speed and Profit into Angular Drilling, Milling, Planing, Shaping, Grinding

With a Boston Universal Angle Plate on the lob, work is quickly set up on the table and but a few seconds are required to locate it at the desired angle. Indispensable in tool rooms and extremely useful in production runs, the Boston Universal pays for itself many times over by eliminating the necessity of expensive jigs and fixtures.

Made in several stock sizes. Write today for full information.

MACHINERY CO., Inc.

11 ARBORETUM RD. BOSTON 31, MASS.

On-the-job mitering with hand tool

tical motion, 120 degrees. Fitted with

vernier scale reading to 5 minutes.

Lander & Abbott, LaCrescenta, Calif., announces a hand tool that enables onthe-job mitering of metals with the ease and precision of heavy, stationary

machine operations.

The leverage is said to make clean, accurate cuts with a minimum of effort. Various types are available, all hardened and precision ground tool steel, for burr-free mitering, notching, slotting of non-hardened steel up to 1/32" and metals like copper and aly aluminum up to 1/16". A snap-in feature makes dies instantly interchangeable, for working with moulding, sheet metal, fiberboard, plastics, masonite etc. The weight is two pounds.



MIDGET" "MIGHTY LINE THE

ORDER DIRECT on 10 day Money Back Guarantee MIGHTY MIDGET ANGLE DRESSER



Hardened Shaft, Bearing Adjustable for Wear. Accurate, Adjustable 180° Stops. Diamond always Clamped Perfestly in Center. 10" Wheel Size for Norton DeAll \$46.00 with Diamond

Special 14" Size \$89.00 less Diamend

DIAMOND \$7.00

First low coar h igh procision Angle Dresser on the market. Can be set very se-curately with a protractor. Works undermeath the wheel. Large wheel.

\$39.00

Heat Treated Cast Iren. Ball Thrust Bearing. Guaranteed Accurate

Please give DO number when possible.

SPERMAN METAL SPECIALTIES • 2199 E. 21st ST., BROOKLYN 29, N. Y.

Grinding wheel retains sharp cuttting edge

Development of a new type of cup grinding wheel which retains its sharp cutting edge throughout its service life has been announced by the mechanical goods division, United States Rubber Co., Rockefeller Center, N. Y., dept. BB.

The wheel has a hard shell of tough resin-bonded abrasive built around a core of rapid-cutting resin-abrasive construction. This shell, which is three-sixteenths of an inch thick, resists "mushrooming" or rounding of the wheel's cutting edge. Wear occurs evenly across the entire face of the wheel.

It is particularly useful for grinding accurately hard-to-reach corners and complicated shapes. Accurate corner grinding is possible throughout the service life of the wheel because of its even wear.

Preparation for welding, foundry operations, finishing welds and machine shop work are some of the applications for the new wheel.

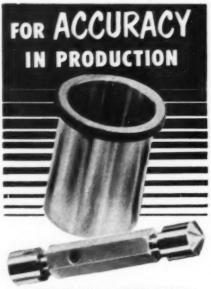


Its overall diameter is tapered from six inches to four and three-quarters inches. Its thickness is two inches and it is available for three standard types of arbors. It is marketed under the trade name U. S. Royalite Hard-Shell Cup Wheel.









ECONOMY PRECISION BUSHINGS AND GAGES WORK HAND IN HAND



- A.S.A. standard and special drill jig bushings,
- A.G.D. plug and ring gages, both new and chrome plate.
- Gages salvaged by hard chrome plating.

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1829 S. 68TH ST., MILWAUKEE 14, WIS.

Famco power press with electronic clutch

The Famco Machine Co., Dept. BB. Kenosha, Wis., has announced its Model 59 Electromatic Power Press, featuring a new instant-action, electricallyoperated, nine point jaw clutch which combines the simplicity of electric control and the high efficiency of jaw clutches. Famco's patent - applied - for Electromatic clutch gives this 18 ton press added versatility and ease of operation. It is activated by a simple touch of the foot control, or optional hand controls. The manufacturer states that the simple design of the Electromatic clutch means lower maintenance costs than that with ordinary mechanical clutches.

A limit switch on the clutch housing provides single stroke control. The selector switch readies the press for



either single stroke non-repeat, or continuous action, without stopping the press. A neutral position locks clutch in place regardless if foot or hand controls are activated. An electronic timer converts the press into a fully automatic machine.

The frame of the Famco Model 59 is of similar construction to that of other presses in the Famco line. It is constructed of close-grained, extra heavy cast semi-steel. It has a one-piece, heattreated alloy crankshaft, split bronzebushed main bearings, and greater ram area. Its semi-steel well balanced flywheel is Timken tapered roll bearing equipped for friction free power. A Bijur hand oiling system is available and may be ordered installed at the factory or added later by the customer.

Pre-hardness test for metals released by U. S. Steel

A tool to help improve defense production has been made available, free of cost, to all American manufacturers of steel, United States Steel, 208 S. LaSalle St., Chicago 90, Ill., announced today.

Research officials explained that the tool is not a "gadget," but a patented method for predicting in advance the hardening characteristics of steel compositions. As varying degrees of "hardenability" are indexes to the usefulness of steel for specific tasks, this knowledge will enable operating men to produce the types of steel that will exactly suit such diverse assignments as tough tank armor, strong struts for aircraft, brittle fragmentation bombs, or easily formable cases for shells.

Conversely, the patented method makes possible the design of steels of required hardening characteristics from the available supply of steelmaking materials. The patent was issued July 3, 1951, in the name of Marcus A. Grossman, and assigned to United States Steel Co., where Dr. Grossman is adviser in research planning. The patent was recently dedicated to the public by U. S. Steel, This action makes it available to all interested parties.

The "hardenability" of a steel, Dr. Grossman asserted, is measured as the depth from the surface to which a given steel composition hardens when quenched. Steel men have known for many years that hardenability in general depends on the chemical composition of a steel—the quantities of various ingredients. By careful experiments and tests of his results, Dr. Grossman was able to assign definite hardenability values to these elements. By now great tonnages of steel have proved the validity of his findings.



Meet sudden and sustained demands for high speed production on lathes, turret lathes, drill presses and milling machines by using the new No. 25 Allison Collet Chuck or Allison Dividing Head. Adopated to use of Jacobs Rubber-Flex Collets in sizes from \$\frac{\pi}{2}\$". To tighten collet, operator simply draws lever ball toward him; to release collet, he pushes lever away. Simple, fast and fool-proof. Speed up every operation for better production profits with the Allison-Jacobs combination.

-	003 South Mesa Street an Pedro, California
	end catalog page and prices on Collet Chuc nd Dividing Head, and name of nearest suppl ouse.
1	AME
A	DDRESS
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Helix adapter for Orlandi gear checker

An adapter and an attachment have been developed by the Orlandi Gear & Machine Co., 16195 Meyers Rd., Detroit 27, Mich. The new adapter simpli-



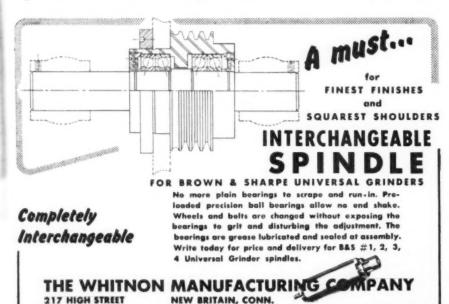
fies set-up for checking helix angle to the point of practically eliminating mathematical computations. The size gauge block required for set-up is determined by simply taking the sine of the helix from the trig table, substracting ½ of the diameter of the adapter pin and adding the net result to the "constant," etched on the machine.

A new rolling attachment for use with master gear makes possible the rapid check of pitch diameter and concentricity accurate to .0001". With this attachment, backlash can also be checked with mating gears or master gears.

Jemco Little Shaver gives close tolerances

For better finishes and closer tolerances, the Jersey Mfg. Co., 401 Livingston Street, Elizabeth, N.J., has added the Jemco Little Shaver to its line of cutting tools. Production tolerances of .00025 are said to be consistently common. The shaver has enabled its users to shave and form parts that cannot be accomplished with ordinary circular form tools.

The Little Shaver will fit the standard circular form tool holder or the back slide on a Brown & Sharpe automatic



screw machine and with slight modification, it can be used on other automatic screw machines, hand screw machines and turret lathes. Easy to set up, the Jemco can use standard rise cross slide cams, going to the center of the work piece using standard adjustment without cutting the cam down.

It is possible to shave thousands of pieces without sharpening or adjusting, eliminating much of the "down time" normally required. Rejections are slight.



The shaver is made in two models—the standard and the special—in three sizes, 00, 0, and 2. The standard model supports the roll on both sides making it ideal for long ordinary runs and forms. The special model permits shaving close to the chuck as it supports the roll on only one side and is used for forms with unusual differences in diameters.

Adjustable drill jig cuts drilling time

The Mathewson Machine Works, Inc., 2 Hancock St., Quincy, Mass., says their adjustable drill jig eliminates layout and can cut drilling time on small lots to a fraction, doing away with special jigs for larger quantities.

Holes for cotter pins, set screws, drive pins for bayonet joints, oil holes in tubular sections, and wiring holes in cap screws, are all typical of the operation that can be done more economically. Hole diameters range from .052" to .531", using a.s.a. standard slip bushings.

The hardened V-Block has two 60degree v's for centering round or hex-



A real money saver for industry.

Proven by the experience of tool and die, electronic machine, radio, electrical and instrument manufacturers.

The Green Engraver zips out precision work on metal, plastics, wood, glass, hard rubber etc. . . . engraves panels, name plates, scales, dials, molds, lenses, instruments, instruction plates, directional signs . . . by simple tracing. Routing, profiling and three dimensional modeling indicate its versatility. Electric etching attachment available.

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Green Instrument Co.

386 Putnam Avenue Cambridge, Mass.

agonal stock, one for ¼" to 21/32" diameter, one for 21/32" to 2" diameter. Adjustable stop for locating work longitudinally for drilling any distance from end, may be used on either side. (Stop rod furnished for up to 9").

Centered above the V is an adjust-



able bushing carrier which holds the slip bushing, and also clamps the work securely to the block. Three bushing carriers are provided to accommodate a.s.a. standard slip bushings with outside diameters of 5/16", 1/2" and 3/4".

Overall dimensions are: 5¼" high, 4¼" wide, 7" long. Shipping weight: 10 lbs.

Open-meshed "sandpaper"

"Gritcloth," a screen-like sandpaper that allows residue to escape through



the mesh instead of clogging, has been announced by Bay State Abrasive



INCLINABLE PUNCH PRESSES SERIES A

Lijobinson

A-5 Motor Drive 88 Ton Geared Inclinable Punch Press with Anti-Backlash Brake to take care of kick back when using air cushion and heavy spring pressure pads. Timken bearings in clutch wheel and back shaft bearings. Available in 14, 22, 32, 56 and 88 ton capacity. Literature on request.

New Albany Machine Mfg. Co. New Albany, In

Ind.

Products Co., 154 Front St., Worcester BB 8, Mass.

Imbedding the abrasive in a tough, open-mesh fabric that holds the cutting material firmly, but lets the removed stock flow through the holes, is said to increase the life of the product from 10 to 15 times as long as ordinary sanding type of papers.

Available soon in all the finer grits suitable for smoothing surfaces on either wood or metal, either side of "Gritcloth" can be used wet or dry, flat or folded, on sanding machines or by hand, and it is easily cleaned by rinsing in water.

Metal-cutting band saw with 8'8" x 10' table

This huge band saw, according to its manufacturers, the Tannewitz Works of Grand Rapids 2, Mich., will be used in conjunction with a 50,000 ton press, for trimming the edges of complete airplane wing stampings. It is equipped with



two regular 36-inch wheels above and below the sawing area and a third wheel of 30-inch diameter in the column at the left of the table. It is powered by a 15 HP motor and multiple V-belt drive. This is one of a number of models available for unusual metal-cutting jobs.

Air drill unit claims advantages

The Gurmendi air drill unit, manufactured by Alkon Products Corp., 698 E. 142nd St., New York 54, N.Y. contains a unique hydraulic monitor which

PROTECTRON Makes Money for you **PROTECTRON** converts the Lost Hour into production and Steps up Output of your present equipment 121/2% to 22% **PROTECTRON** reduces Tool and Die Breakage up to 86% YOU will GAIN up to 300% in Manpower ire . . . phone

ROLL FEEDS

PRECISION FEEDS FOR ALL TYPES OF PRESSES





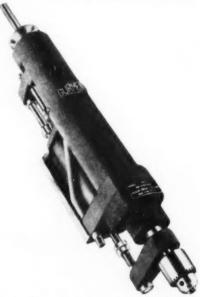
Now you can be sure of nonslip, accurately measured feeding (in thousandths) on your punch presses, either bench or pedestal types. Instantly reversed by merely shifting feed finger spring from one lug to the other! Original setting is maintained as there are no ratchests or pawls to wear. Plan to aquip your presses with Roll Feeds. Write teday for complete list and dats.

EARLY DELIVERY ON STANDARD MODELS

ROLL FEEDS CORPORATION
Powtucket -:- Rhode Island
An Electrix Affiliate

takes the "sponginess" out of air, resulting in quick approach to the work, positive adjustable rate through the work, with no danger of break through, and rapid return.

The precision unit has positive stop adjustments on both forward and return strokes. Stroke is a full 2" with controlled feed of 1½". Control of the feeding rate is taken over at any desired point in the spindle travel by the hydraulic monitor giving a fully adjust-



able feed rate. It was designed for universal application where a job calls for high speed production. The base is machined accurately to the alignment of the spindle facilitating easy set-ups on brackets or fixtures. The compact design allows a set-up of two or more drill units as close as two inches between centers. Evidence of design planning based on flexibility is illustrated in the spline pulley arrangement, where power is applied. Many units can be powered by one motor, any standard make or size of capacity to do the job. Each unit's speed (up to 12,000 r.p.m.) is easily adjusted by the size of the standard spline pulley.

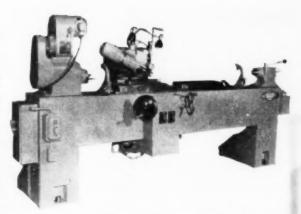
Broach sharpener

A universal type broach sharpening machine, designed to sharpen both round and flat type broaches has been developed by the American Broach and Machine Co., of Ann Arbor, Mich.

The fixed machine bed offers two distinct advantages . . . the broach is held securely in a rigid position with no chance for misalignment and less floor space is required than broach sharpeners of more con-

ventional type,

With the broach held stationary the adjustments for sharpening are made with the grinding wheel spindle, which is mounted on a traversing carriage and equipped with micrometer adjustment. A 3600 r.p.m. motor drives the spindle



and has provisions for adaptation up to 15,000 r.p.m.

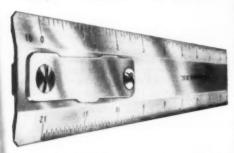
For quick conversion to flat or surface broach sharpening, American offers, as optional equipment, a Sundstrand Magnetic Viking Chuck with power unit and demagnetizer.



Standard line of Duraline drafting machine scales

Universal Drafting Machine Corp., 7960 Lorain Ave., Cleveland, Ohio, is introducing a line of standard improved metal drafting machine scales marketed under the trade name "Duraline." The line consists of twelve standard types of graduations most used by civil, mechanical and electrical engineers, draftsmen and architects. Each style is available in 6, 12, 18 and 24 - inch lengths.

Duraline scales are made of an aluminum alloy, one of the most stable materials and one that possesses advantages of boxwood. It will maintain



its engine divided accuracy and hold a true smooth ruling edge. Uniformity of line length and depth of the large, easily read numerals are immediately apparent. The graduations do not extend to the drawing edge—consequently with no "file teeth" to act on the pencil point, graphite smears are eliminated and drawing stays clean. Aluminum will not warp, crack, chip, peel or burn.

These scales are ground from solid aluminum flats in two operations to produce the special stiff, light shape illustrated—then engine divided at 70°F to produce graduations of high accuracy. After the graduations are blacked-in, a new anodized finish is applied that makes lines and figures stand out in contrast against the dull light gray of the metal.

Micrometer head with non-rotating spindle

Reading directly in tenths and by vernier to .000 025", this head, manufactured by the Boeckler Instrument Co., 39 E. Rillito St., Dept. BB, Tucson, Ariz., has a spindle which does not rotate as it is advanced or retracted. Such a non-rotating spindle lends itself to special applications, and chisel or other special shaped anvils can easily be provided.

The lead-screw, ground from the solid, hardened and normalized stock,



has an over-all accuracy of .000 050" in pitch throughout its working range. Compensation is provided by the dial mounted scale and vernier, which is individually set as each instrument is calibrated. This individual setting of each head is to an accuracy of 15 millionths. The non-rotating spindle feature eliminates wear between the spindle and the part against which it will bear.

Copying attachment makes lathe automatic tracer

This Swiss hydraulic attachment, the Bondycop, introduced by Morey Machinery Co., Inc., 410 Broome St., New York 13, N. Y., means a considerable increase in production if advance information is any criteria, since almost any lathe can be changed into an automatic tracer controlled machine, in a few minutes.

Once set, the attachment need not be removed when not in use as the function of the lathe for uses other than copying is in no way hampered. For a pattern, the Bondycop uses

For a pattern, the Bondycop uses either the first piece of a batch, or a jig, and the chance of error is reduced to a minimum since the operator controls only one measurement. He is

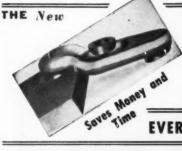
NEW	HIGH	SPEED WIRE		DRILLS
Siz	20	Overall Length	Flute Length	
. 83		3"		134"
	5 M.M.	31/2"		2%*
3.4	M.M.	218"		148"
C		31/2"		11/4"
2		21/2"		8"
5		21/4"		1"
10		33/4"		1"
12		356"		236"
13		21/2"		11/4"
18		21/2"		11/4"
A.		21/2*		11/2"
10	00 dez.	drills in variou	a sizes as :	ahove.
A	tremend	lous bargain at	only \$2.00	0 doz.
	(dis	count on large q	uantities)	
40		2"		1-
50		13/4"		36*
		available at e		dez.
	1.0	is on large my	camtition's	

HEW 360" SWIVEL TYPE BORING BAR: BORING BAR: Here is a tool that will do the work of a left, right and straight tool holder, plus a bering bar, all for a fraction of its original cost.

TOOL A takes a \$\frac{1}{2}\times a_1\times a_2\times a_3\times Money-back Guarantee—All merchandise new. All items shipped PPD!

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T&TTOOL 221 W. 2nd, Tulsa, Okla.



MATHISON DROP-FORGED SELF ALIGNING STRAP-CLAMP

Work pieces are held securely on machine tables, Work pieces are held securely on machine tables, face plates of lathe milling machines, boring mills, planer or punch presses and fixtures. Adjustable and self aligning to permit use on a wide variety of sizes and shapes, 5" Strap-Clamp holds work pieces up to 2" without blocking or shims, 8" size does same up to 3". Write today for full details.

Distributors wanted.

4116 Fourth Avenue EVERETT SALES CO. Brooklyn 32, New York

You Need an Extra Hand Now to Speed Up Production! HEIMANN TRANSFER SCREW SETS

IN 11 SIZES-No. 6 to 1" N.C. In all S.A.E. sizes.

Here is the faster, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench-no other tools needed. Get more work now-save money too!

MFG., CO. ANN URBANA



347 MIDLAND AVENUE . DETROIT 3, MICHIGAN

fully protected from hot turnings as these are thrown out at the rear of the lathe.

The Bondycop will copy angles of 90° in the direction of the headstock, allowing a heavy cut to insure a smooth surface and save grinding operations. The standard size unit can be used for all diameters up to 6" and can also



be supplied in sizes 40" to 80" between center points.

The four essential parts are the motor, the jig holder fixed at the rear of the lathe, the hydraulically controlled tool holder and the control lever. Simplification makes the reading of the machine drawing quite easy since the operator checks only one diameter and has the specimen constantly before him. The Bondycop also can be used for milling.

Globe hand-screw machine combines two in one

A 10" hand-screw machine for both low speed production work and high precision secondary operations is announced by Globe Heat-Seal, Inc., 3380 So. Robertson Blvd., Los Angeles 34, California.

The machine offers the features of extreme ruggedness with a range of slow spindle speeds for heavy roughing operations and high accuracy with exceptionally fast spindle speeds for small diameter, close tolerance work. R.P.M. range is from 184 to 3796 in 16 different spindle speeds. A four position quick change gear box makes instant speed selection possible. A 1 h.p., two speed,

instant-reversing motor powers the spindle. Slippage is reduced to a minimum over the entire speed range even under heavy cuts by twin vee belts. Accuracy is assured by precision tapered roller bearings in the headstock with take-up features. Bearings are sealed against dirt and other undesirable contaminants.

All castings are normalized to prevent warpage. The 40-1/4" bed is one piece, high chrome cast iron with 6" ways hardened for exceptional life and



freedom from scoring and ground for accuracy. Length of bed to headstock is 31-3/2". Length of area from nose of spindle to face of turret is 18-7/8".

The large spindle, equipped with a No. 5 Morse Taper, has a 1-7/16" inside diameter and accommodates work capacities of 1" with bar type collet closers and 1-3/8" using nose type collet closers. A draw-bar type collet closer is supplied with the lathe.

Globe self-indexing bed turret and heavy-duty production cross slide are standard equipment. These two accessories are also available independently for use on most standard lathes swinging from 9" to 12" and some 13" lathes.



Plain or Back-Geared—Forged steel spindle with anti-friction precision bearings, friction clutch and brake. Spindle nose, 23%"-8.

Write today for complete details.

HERE IT IS!

The new Simmons No. 2 Turret Lathe, offered to you with three distinct advantages:

- Low Cost
- High Precision
- Early Delivery

11/4" bar capacity...14" swing over ways. Micro-Speed Drive offers infinite speeds—plain, 375 to 1500 RPM; back-geared, 44 to 750 RPM — for bar or chucking work. Power feed to turret.

SIMMONS MACHINE TOOL CORP.

1725 North Broadway, Albany I, N. Y.

New York Offices: 50 East 42nd Street

Rubber rim abrasive belt contact wheels

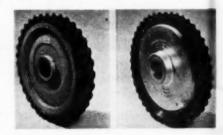
Behr-Manning Corp., Troy, N. Y., Div. of Norton Co., has been instrumental in the development of an entirely new design in abrasive belt contact wheels. This new principle has been embodied in an abrasive belt contact wheel known as the "rubber-rim" wheel.

The wheel is constructed from two basic members; a steel rim onto which rubber in durometers from 10 to 90 has been molded and a set of flanges which contain the rubber rim.

These are said to offer several advantages over the conventional solid disc wheels which are constructed of rubber molded onto a solid aluminum disc. They are lighter in weight, an important factor for required balance in high speed "roughing" operations, and the rubber face can be rapidly replaced with a new rim should it be damaged or worn out. Due to the simplicity of

replacing, wheel costs are materially reduced over present molded rubber disc wheels.

The new wheels are available in the popular Behr-Manning "cog-tooth" design as well as the regular 45° serrated and the straight face wheel. They



are available in 14" and 16" diameters.

They are now being made by Divine Brothers of Utica, N. Y., and the Chicago Rubber Co. of Chicago, Ill.



2,000 psi Series HYDRAULIC CYLINDERS

A "trouble-free" cylinder!— we urge comparison. Field experience dictated simplification. Every refinement. "0" Ring Gaskets seal with pressure. There are no assembly bolts—3 parts only!—each cylinder tested for twice the pressure. Can't leak. All type mountings, 1" to 8" bores. Standard and heavy duty piston rods. Write requirements for quotation and quick delivery.

(WE HAVE SOME TERRITORIES OPEN)

FISHBURNE MACHINE COMPANY ASHEVILLE: N · C

Combination vise, angle plate

The Kearsarge Tool and Mfg. Co., 512 Franklin Ave., Pittsburgh, 21, Pa., announces the development of the Squar-Up, a combination vise and angle plate with two independent clamping jaws. These jaws can be adjusted to an infinite number of positions, permitting clamping pressure to be put directly on the right spot in order to hold a work piece securely against the squar-

ing face. It is made of precision-ground, case-hardened steel and can also be used as an angle plate.

Squar-Up is said to be able to do things that an ordinary vise can't do. With little clamping pressure, it will hold regular, conical, hexagonal, spherical and irregular shapes securely for machining, cutting, buffing, polishing and other operations. The patented clamping mechanism can be quickly adjusted to any vertical or horizontal

KORFUND Type LK



Vibration transmitted <u>from</u> punch presses, shears, compressors and other machines is destructive and costly. Vibration transmitted <u>into</u> precision machines causes rejects, cuts production.

Both can be prevented—completely and economically.

Korfund Type LK Steel-Spring Vibro-Isolators provide complete Vibration Control. Rugged construction means longer life for long-run economy. Built-in levelling screw eliminates shimming. Adjustable built-in resilient chocks act as stabilizers. Load range, 50% to 17,000% with deflections up to 11/4% depending on size.

Write for your free copy of Bulletin LK-552. The complete line of Korfund Vibration Control products is described in Bulletin G-104, with a selector chart which gives recommendations for both normal and critical conditions. See Sweet's Catalog Files, or write us for your free copy today. Representatives in principal cities.



position. Maximum openings range from 21/4" on the same size to whatever size is needed for specific applications.

Button-head screw for streamlined assembly

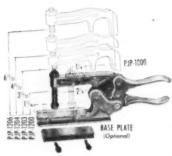
A button-head socket screw, designed for use where streamlined appearance and high strength are wanted, has been put on the market by Standard Pressed Steel Co., Box 606 Jenkintown, Pa.

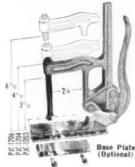
The new screw, latest addition to the SPS Unbrako line, has a low head with a hexagon socket. Made of alloy steel and heat treated, it can be used without loss of strength in place of screws with higher heads, many of which have sharp, dangerous corners. Hence the low button-head promotes safety and ease of cleaning.

The button-head has many applications, particularly where counter-sinking is impractical. It is made in seven thread diameters: No. 8 (.164 of inch), No. 10 (.190 of inch), ¼ inch, 5/16, 3/8,

Introducing 8 NEW KNU-VISE MODELS

—to increase your production clamping efficiency still further by extending your work-holding range. Also bringing to your tool room a new type of equipment, long needed.





Base plate furnished 2 ways: (1) Loose, soft, so you can adopt it to your needs; (2) Installed, hard; thickness, including parallel jaw, 1".

Send for new catalog showing full line of KNU-VISE Clamps.

Sales Offices in principal cities. Teletype DE-49

KNU-VISE PRODUCTS

LAPEER MFG. CO.

3052 DAVISON ROAD . LAPEER, MICHIGAN

½ and 5%. All except the ½ and 5%, which are produced in the National Coarse series only, are available in both National Coarse and National Fine threads. The different diameters, all threaded to the head, come in four to seven lengths. Threads are precision rolled.

Tool cuts pattern cost

A tool that is said to eliminate lengthy calculations, guesswork and troublesome pattern inventories has been introduced by The Jet Tool Co., 283 Nancy Lane, San Jose, Calif. The Jet pattern developer is a simple, easy

to operate tool that provides a quick and practically automatic method of laying out patterns for any type of sheet metal transition fitting.

Of all-aluminum construction, it is readily adjusted to various angles and lengths. Patterns can be laid out exactly without computations of any kind, and fittings are formed without buckling. Even the most complex fittings are readily laid out—round, oval, rectangular, hexagonal or combinations of these—for straight, pitched or offset runs.

NO MORE COSTLY JIGS

on small production jobs with Troyke Worm Wheel Operated Tables



Sizes:

9 - 12 - 15 - 18 - 21 - 25

See your dealer or write for Catalog No. 17. Fully illustrated, show-

ing all models and applications to various work.



Drilling attachments can now be furnished for Worm Wheel Operated Tables.

Cincinnati 9, Ohio, U.S.A.

TROYKE MFG. CO.,

Designers and manufacturers MULTIPLE DRILLING EQUIPMENT

We invite your inquiry.

MICHIGAN DRILL HEAD CO. 971 E. 8 Mile Road Hozel Park, Mich.







MILLED FROM BAR

SET SCREWS

MADE OF ALLOY STEEL



ECONOMY MACHINE PROD. CO., 5207 Lawrence Ave., Chicago 30, III.



Small radius grinder, polisher

The Curtis Machine Div., Lincoln Park Industries, Inc., 1300 E. 2nd St., Jamestown, N.Y. announce their model 400 small radius contour grinder and polisher.

Of welded steel construction, the machine permits constant grinding and polishing of small radius contours with a minimum of machine fatigue, it is claimed.

The standard ½" sealed ball bearing spindle design permits quick change of contact wheels with various width, shapes, diameter and durometer. Posi-



tive convenient tracking mechanism permits the tracking of coated abrasive belts from ¼" to 2" widths. Standard belt length is 111".

The adjustable contact wheel arm permits either sitting or standing operation of the machine, with adjustment of 30" to 38" from floor level. Spring tensioning of the solid cast aluminum offers positive belt control at all times.

The design of this unit offers the finishing of small radius contours such as jet blades and other civilian production where confined area grinding is necessary. It is 46" high and 18"x24" at the base.

SCHAUER SPEED LATHES



The fastest, most economical method of filing, de-burring, polishing or lapping small metal and plastic parts.

There's a Schauer Speed Lathe to solve every individual secondary finishing operation. Chuck, collet or vacuum holding fixtures. Single, two speed or variable speed motors. Bench and pedestal models.



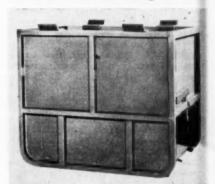
SAVE WITH SCHAUER! WRITE FOR BULLETIN 500

SCHAUER MANUFACTURING CORP.

4502 Alpine Ave., Cincinnati 36, Ohio

Roura drop-bottom container

The Roura Iron Works, Inc., of 1401 Woodland Ave., Detroit 11, Mich., have developed and added to their production the Roura drop-bottom containers. The containers operate with a positive counterweight handle that opens easily. They save effort by being placed on a work surface next to the worker. The drop-bottom permits gravity flow to bring parts directly to the operator's work point—saving the time and fatigue formerly affecting the worker's efficiency in bending over and reaching for parts. The sides of the Roura container are solid from top to bottom. There are no corrugations to catch parts and prevent the bottom from dropping. These containers are also built for stacking to save floor space and can be used for storage purposes-yet can be easily and quickly moved and emptied. Besides being easily accessible to fork trucks, the stacking strips that are welded at four points on the top are designed to allow loops for overhead lifting equipment. The sides are heavy 12 gauge, reinforced with 2" channels and electric welded throughout. The



drop bottom opening is 13" high x 31½" wide. In the box shown, the overall sizes are 36" wide x 48" long x 39" high, the capacity is 3/4 yard; weight is approximately 400 lbs. Other sizes can be built to meet requirements.

Advanced methods with surface grinder

surface grinding machine offering a unique and advanced grinding method has just been announced by the PDQ Grinder Co., 6 Manhasset Ave., Port Washington, N. Y. This new grinder is designed for the fast and accurate generation of flat surfaces on various kinds of metal parts including cast iron, steel, tool and stainless steels, die castings of aluminum or zinc, bronze and alloys of various kinds. It is also adaptable to the grinding of plastics, ceramic parts, glass and other materials requiring rapid stock removal and flat surfaces.

The unusual grinding principle employed in the PDQ Grinder con-

sists of a cylinder-type grinding wheel mounted in a vertical plane and recessed within the actual work surface of the grinding table. The machine employs a large 12" diameter cylinder type grinding wheel and permits the finishing of surfaces as wide as 91/2" and parts can be of any reasonable length or height. This grinder claims extreme ease of operation and eliminates the need for various holding fixtures or magnetic chucks due to the simplicity of the operating principle employed. Exceptional speed is possible as work pieces are simply passed across the face of the grinding wheel and the amount of stock removal is regulated by means of a positive feed control governing the depth of cut for various classes of work.

Another desirable feature is the removable front section of the work table permitting the grinding of parts having side obstructions or angular surfaces which could not ordinarily be ground on a flat bed type surface grinder. The removal of this section permits should-



The unusual grinding principle employed in the PDQ Grinder consists of a cylinder-type grinding wheel mounted in a vertical plane and recessed within the actual work surface of the grinding table.

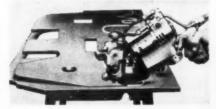
ers to pass within the area of the machine and surfaces at right angles may also be ground at the same time in many instances. In addition, when extra width capacity is required, the entire guide fence may be raised making it possible to grind pieces up to 12" wide. The precision grinding wheel spindle is carried on oversized pre-loaded duplex type, sealed self-lubricated ball bearings assuring accuracy and service. The main drive is from a heavy-duty type two h.p. vertical mounted motor through multiple "V" belts to a floating spindle pulley carrier.

Accessory and other equipment available includes a complete motor driven dust removal system for dry grinding and also a complete coolant system having a built-in motor driven pump and separate tank for wet grinding operations.

Dimensions are: overall height to top of guide fence 38"; height from floor to work table surface 34"; work surface 36"x20"; length 40"; floor area occupied 3'x4'; shipping weight approximately 1200 pounds.

American Pullmax announces hand operated flame cutter

The Cadet, a portable, hand operated flame cutting machine which weighs only 19 lbs., has been announced by American Pullmax Co. Inc., 2455 Sheffield Ave., Chicago 14, Ill. The company states that the all-purpose, easy to



operate Cadet will do plate cutting from 5/64" to 21/4".

This oxy-acetylene flame cutter will do straight cutting and "I" beam cutting. It will do circle cutting to a radius of 1", and will also do bevel cutting. The torch of the Cadet can be

set at any angle for bevel cutting. Graduations in five degree increments are inscribed in the torch holder body.

The Cadet has a self-contained, electrically driven motor. A table is a .tached to the machine giving proper selection of cutting speed, oxygen pressure and torch tips-even the correct distance between tips and work surface. The torch is adjustable both vertically and horizontally.



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Letters & Figures



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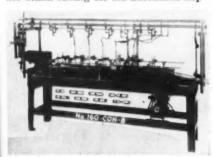
HOGGSON & PETTIS MFG. CO., NEW HAVEN, CONN.

Eisler high speed continuous bottoming machine

A high speed automatic bottoming machine has been developed by the Eisler Engineering Co., Inc., 762 South 13th St., Newark 3, N. J., for making round or flat bottoms, vials, eye droppers, or similar products such as small bulbs for radio tubes and telephone

The machine can be adapted to handle all kinds of glass tubing, soft glass or pyrex glass, from \%" to \%" diameter, and the length of the finished product can be adjusted from 1" to 6". The production output is said to be from 8,000 to 16,000 per hour, depending on the tube diameter, wall thickness, and the nature of the glass tube products.

The driving mechanism is powered by a ½ h.p. motor and speed reducer. A series of rotating shafts with glass roller moves continuously, while taking the blank tubing off the automatic hop-



per feed. The glass tubing is carried in a horizontal position under a row of ribbon burners. These ribbon burners are placed on the bottom and on the top of the glass, and the finished product is discharged on the opposite end of the machine. Various other types of glass which have similar operations can be easily adjusted on the machine.

The operation is very simple. The glass is cut in double length. The operator loads the hopper feed, and the rest of the operations are fully automatic until the products are complete and roll off the machine. Floor space is 30"x 135"x80" high. Approximate weight:

1600 lbs.

Sleeve and jack provide finished plug

These related products, in great demand by the armed forces for communication, and also in industrial equipment, are claimed by the manufacturers, Switchcraft, Inc., 1328 N. Halsted St., Chicago 22, Ill., to have more rugged assembly, due to new construction features.

"Littel Plug" (PJ-055B), features a one-piece tip rod, which together with the sleeve is assembled into the mold as an insert, providing a finished plug with complete continuity of thermoplastic insulation between this tip rod

and the sleeve of the plug. No. 820 "Extension Jax" (JJ-026), features spring tempered nickel silver



springs assembled into a rigid stack assembly, insulated by phenolic spacers and tubing, firmly assembled to long brass body by stainless steel screws.

Warns of low air in tire

A device, made by Reardon Products, 2109 S. Adams St., Peoria, 2, Ill., is said to warn motorists of an approaching flat.

Attached to each wheel, and each consisting of a thin metal strap, depressed at one point just enough to cause a "click-clack" as the "soft" tire pushes against it at each rotation, the device works on the same principle as a child's toy.

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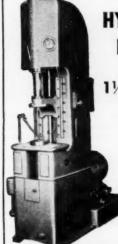


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Platform provides safe footing

All-steel welded tubing, expanded metal treads, provide safe footing and ample space for both tools and workers on portable platforms made by the Ballymore Co., Wayne, Pa. For assembling large machinery and machine tools, army tank turrets and guns, etc.,



aircraft production and airport inspection purposes, bus and truck maintenance and many similar applications, they are useful.

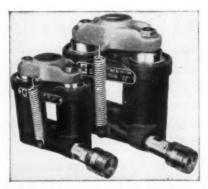
Built to order to meet specific requirements for length, height, width and rail construction, Ballymores are rigid and sturdy, eliminate unsafe horses-and-planks platforms, temporary scaffolding and heavy, hard-to-move wooden work structures.

30-ton power-twin hydraulic ram

The Owatonna Tool Co., 382 Cedar St., Owatonna, Minn., announces a new 30-ton power-twin hydraulic ram similar in design and with the same features as the popular 17½-ton ram but having almost twice the power.

Weighing only 23 lbs. the ram is said to do pulling and installing jobs heretofore thought impossible. It works in any position, is fully adjustable, and eliminates torque. It is 6-3/4" high, 7½" wide, 3" thick and has a 2½" ram travel. Both the 17½ and 30 ton rams work off the same size pump which operates by remote control to insure safety.

Complete sets of attachments are

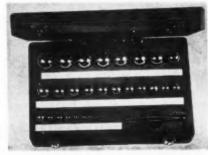


available for use on industrial tractors, earthmoving equipment, for industrial plant maintenance and a wide assortment of pulling and installing operations.

Sets of master balls

Industrial Tectonics, Inc., 3684 Jackosn Rd., Ann Arbor, Mich., announces two sets of super-precision master balls for use in setting comparator gages, as measuring standards, and for other applications in the toolroom, gage room and inspection department.

Set No. 16 consists of 16 balls from



1/16" to 1" diameter in 1/16" increments. Set No. 32 consists of 31 balls from 1/16" to 1" diameter in 1/32" increments. All balls are hardened chrome steel, held to plus-or-minus .000010" on diameter and .000010" sphericity, and with a surface finish of 1 microinch r.m.s. or better. Each set is furnished in a wooden case, with tweezers for handling the smaller balls.



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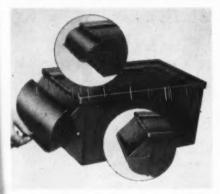
4725 IOWA ST. CHICAGO 51, ILLINOIS

Hooded stackbin

Stackbin Corp., 1085 Main St., Pawtucket, R. I., has designed this unit to protect small parts and materials from dust and to permit handling, even on trucks or inclined conveyors, without spilling the contents.

The hood is securely fastened in the closed position by a positive latch, easily released by light finger pressure.

Like all other patented Stackbins, the



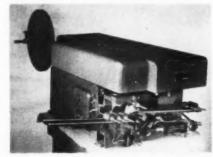
new hooded models stack together quickly and positively in tiers for either storage or assembly. Full width hoppers and smooth interiors assure maximum speed in handling small parts and materials. Ruggedly built of heavy sheet steel and angle iron, Stackbins keep parts and material accessible in space-saving stacks. Standard sizes range from 3½" x 6" x 3¼" to 15" x 24" x 11".

Armature slot insulating machine is automatic

Previously loaded manually, this machine manufactured by The Globe Tool & Engineering Co., 432 Davis Ave., Dayton 3, O., now forms individual insulators automatically from roll strip. They are cut off and inserted into the armature at the indexing position. Upon completion, the armature is deposited on the off-bearing rack, and a core from the entering rack is picked up and insulated.

Cycle control switches constantly guard the machine, stopping the cycle

upon shortage of approaching armatures, excess of leaving armatures, shortage of insulating paper supply,



or possible jammed operation due to faulty lamination.

Production rate, when materials supply is uninterrupted, maintains at a constant high rate. Over 600 eight-slot armatures, or 450 twelve-slot armatures would be insulated per hour.

Two purpose vacuum pump seal bearing

A two-purpose bearing, made by Bronze Bearings, Inc., 890 North Ave., East Cranford, N. J., supports a shaft and serves as a bearing, but also acts as a seal support. The composition, a



high lead tin bronze or bearing bronze—copper 83%, tin 7%, lead 7%, and zinc 3%—was selected for a general utility purpose affording medium tensile strength and good bearing qualities. It is similar to S.A.E. 660, A. S. T. M. B30-45T or No. B144-64T or A, S. T. M. No. 3B.



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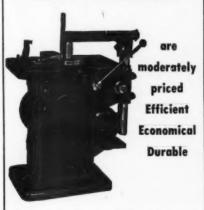
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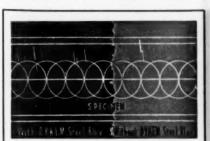
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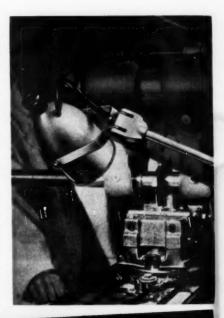
Adjustable machine lamp

Announced by Bretford Mfg. Inc., 9356 Chestnut Ave., Franklin Park, Ill., is a fully adjustable machine lamp which throws a flood of light directly on working areas. The Bretford Lamp is a heavy duty type designed to eliminate maintenance except for normal replacement of bulbs.

To avoid oil damage, Textolite bearings and an oil resistant cord with a supplementary Vinylite insulation are used throughout. Further protection against electrical failure is provided by not running the cord thru swivels or bearings.

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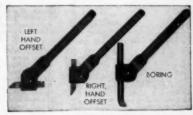


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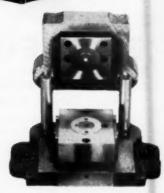
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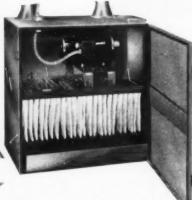


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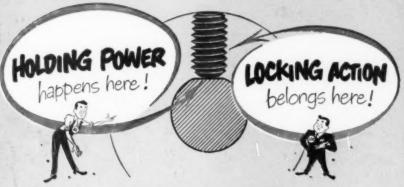
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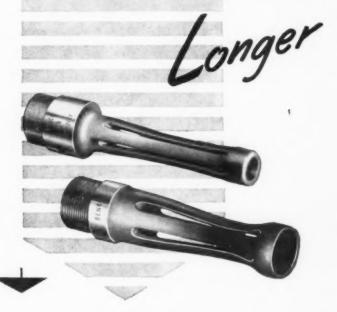
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